Snohomish River Basin
Interim Salmon Habitat
Protection and Restoration Strategy

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I. BACKGROUND

In 2001, the Snohomish Basin Salmon Recovery Forum (Forum) completed the Snohomish Basin Near Term Action Agenda (NTAA). The Chinook-focused NTAA was created to provide guidance for two to five years while a longer term, multi-salmonid species plan was developed. The NTAA included a capital project strategy. The Forum discussed the Interim Habitat Protection and Restoration Strategy on December 4, 2003 and agreed that it should supersede the NTAA capital project strategy and be in place until the Forum completes their basin-wide draft salmon conservation plan in June 2004.

This Interim Habitat Protection and Restoration strategy was created to 1) take advantage of the updated scientific information and priorities being set by the Forum as part of the development of the long-term salmon conservation plan; 2) address concerns raised by project sponsors and the state Technical Panel about the capital project strategy in the NTAA; and 3) respond to the new Lead Entity Guidance and questions put forth by the Salmon Recovery Funding Board (SRFB). The Forum is using guidance from the federal Technical Recovery Team (TRT) and SRFB to develop a multi-salmonid species conservation plan that will be used as a chapter in the recovery plan for Puget Sound Chinook. The salmon conservation plan for the Snohomish River basin will include recommendations for capital projects, regulations, non-regulatory incentive programs, and other actions.

The strategy document is organized into three sections: Section I describes the process by which the long-term strategy is being developed and the questions posed by the Salmon Recovery Funding Board. Section II describes the details of the interim strategy including descriptions of the sub-basin strategy groups and how sponsors should use them. Section III is two appendices. Appendix A is the Forum's draft decision-making criteria. Appendix B summarizes the steps of the *Ecological Analysis for Salmonid Conservation* including the basin recovery hypothesis. This appendix also has specific information about the recommended action priorities across the basin and for individual sub-basins.

II. OVERVIEW OF STRATEGY DEVELOPMENT PROCESS

The Forum's goal for the conservation plan is the same as their mission:

> "To protect, restore, and enhance the productivity and diversity of all wild salmon stocks in the Snohomish River basin to a level that will sustain fisheries and non-consumptive salmon-related cultural and ecological values."

To develop a plan that meets local needs and follows TRT, state, and regional guidance, the Forum is considering scientific analyses, socio-economic concerns, and community input. The draft plan is slated for completion in June 2004, following the regional recovery timeline set by the Shared Strategy for Puget Sound. The Forum's multi-step process includes:

- Reviewing scientific information about what is likely to be needed for recovery from a salmon perspective. This *Ecological Analysis for Salmonid Habitat* is the scientific foundation for the Forum's conservation plan.
- Identifying socio-economic concerns and measures so that various recovery alternatives can be evaluated. A decision-aided approach will be used to compare recovery alternatives in terms of benefits to salmon and other issues such as cost, equity, potential impacts to agricultural land and other important community issues. The Forum has chosen this process because it will allow them to see trade-offs and better understand the variety of viewpoints at the table. The Forum's decision making criteria are in Appendix A. These are based on input from the Forum and the broader community.
- Developing recovery alternatives. These will be based on 12 sub-basin strategy groups with unique recovery roles and actions for all areas of the basin, as well as the Forum's socio-economic considerations. The Forum is currently working on this step.
- Evaluating recovery alternatives. This will include both modeled results of fish population performance and evaluation of the socio-economic issues. This will occur in the winter of 2004.
- Selecting a recovery alternative for the draft plan. Each strategy group will have a different priorities and a different mix of capital, regulatory, and non-regulatory program recommendations This will happen in spring 2004.
- Ongoing community input throughout the planning process. This includes meeting with groups and interests represented on the Forum, as well as throughout the broader community. Community involvement will be important part of building agreement for implementation.

Planning Process Roles

The 38-member Snohomish Basin Salmon Recovery Forum is guiding the development of the salmon conservation plan, including the project strategy. Forum members include Snohomish and King counties; Tulalip Tribes; cities throughout the basin; water utilities;

special purpose districts (such as the Port of Everett); representatives from a variety of interests including agriculture, environment, business, and development; and citizens.

Two committees assist the Forum. The Snohomish Basin Salmonid Recovery Technical Committee (Technical Committee) is completing the *Ecological Analysis for Salmonid Conservation* in cooperation with NOAA Fisheries (as part of a case study with the Puget Sound Technical Recovery Team). Members of the Technical Committee include scientific staff from agencies and organizations represented on the Forum, as well as federal agencies such as NOAA Fisheries.

The Forum's Policy Development Committee previews policy issues for the Forum and makes recommendations for Forum consideration. The Policy Development Committee has been instrumental in working through the social and economic decision-making criteria that the Forum will use when evaluating alternatives for the conservation plan. The Policy Development Committee is comprosed of some Forum members and alternates, as well as staff to Forum member agencies and organizations.

Community input into the conservation plan is a priority for the Forum. Community input includes soliciting ideas and concerns from citizens and interested organizations, and other agencies about the recovery alternatives and scientific information for the plan. Forum staff have and will continue to meet with various groups such as farmers, business interests, recreational users, American Rivers, as well as urban and rural citizens. In addition, Forum staff works with jurisdictions throughout the basin to implement multiple aspects of the plan. As the recovery alternatives are further developed, additional community involvement will be needed.

Relationship between Interim Strategy and Conservation Plan

This *Interim Habitat Protection and Restoration Strategy* is based on the *Ecological Analysis for Salmonid Conservation* and the Forum's guidance to date. It describes each sub-basin strategy group and current conditions, recovery role hypothesis, and the priority categories for on-the-ground actions. It is important to remember that the Forum has not yet discussed how the on-the-ground actions should be prioritized and the mix of how these could be accomplished through capital projects, regulations, and incentive programs.

Multi-species. The Forum's conservation plan is for multi-species of salmonids. In the basin, Chinook salmon (both Skykomish and Snoqualmie stocks) and bull trout are listed as threatened under the federal Endangered Species Act (ESA). The Snohomish River basin is the largest producer of wild coho in Puget Sound. Although the Interim Strategy and the conservation plan prioritizes Chinook and bull trout, actions are included that benefit coho and other salmonids because the Forum wants to avoid future ESA listings for coho and other salmonids. The Forum recognizes the importance of local actions to support regional delisting of Chinook and bull trout.

Habitat targets: It is likely that the Forum will establish habitat condition targets for some or all of the 12 sub-basin strategy groups. The goal of these habitat condition targets will be to improve fish population performance for abundance, productivity, diversity, and spatial structure. These targets are under discussion and have not been adopted for either the short- or long-term.

For Chinook, the Forum has partnered with the regional recovery planning group, the Shared Strategy for Puget Sound. The Forum has received, but not yet adopted the co-manager or other targets. The Forum will have further guidance on this after the alternatives are developed and refined.

Community support: The Forum strongly values community input into the planning process. The Forum has not yet set community priorities, and therefore no new community support actions are identified in the Interim Strategy. The Interim Strategy uses the community priorities set forth in the NTAA. As the Forum gets closer to refining, evaluating, and selecting an alternative, it will be important to identify the geographic areas and actions a) that have currently have support for implementation; and b) where more community support and trust-building will be needed. For example, maintaining a viable agricultural community is important to both local farmers and the Forum and the Forum has been working to improve communication with farmers. As some actions in agricultural areas of the river mainstems may be sensitive, ongoing effort to continue developing a shared understanding is likely to be needed.

For the Fifth Round of the Salmon Recovery Funding Board the Forum has requested to see a demonstration project on farmland. This will help build trust and support for restoration projects in agricultural areas. See Part III for more details.

Measuring progress and success: Measures of progress and success help determine if actions are working or need to be adjusted. Measures also build continued community support for projects and salmon recovery. This interim strategy does not have progress and success measures or measurement criteria as these will be determined after the Forum selects a recovery alternative.

Encouraging implementation of high-priority actions: High priority actions could include those that: a) address an important habitat problem; b) can be affected by local action; c) address an urgent need; or d) are an important step or pilot action in building community support. The interim strategy identifies high-priority areas and the types of actions that are important in each of the sub-basin strategy groups. The interim strategy does not lay out how to encourage implementation of high-priority actions because the Forum has not yet made a final decision these.

To encourage implementation of high-priority actions, the Forum is likely to consider giving more weight to certain types of projects or areas when evaluating proposals; conducting specific outreach with project sponsors so that they are clear about the

Forum's priorities; distributing grant information to sponsors so that they are up-to-date on funding opportunities; and working with landowners and sponsors to develop creative and innovative approaches.

Use of the plan/strategy. The Forum intends that a wide range of agencies, organizations, and even individuals will implement the plan. The plan will outline known needs for salmon recovery in the Snohomish River basin. It should be highly valuable to agencies working in the basin and can be used to set priorities for many types of efforts. The Forum's plan will be a chapter in the Puget Sound Chinook Recovery Plan.

Many agencies and organizations will likely use the plan to inform other planning processes (such as Comprehensive Plans and Shorelines updates) and help set development mitigation priorities. The plan can help agencies prioritize their internal capital project programs. Most agencies and organizations seek capital project funding from many sources and are likely to use the strategy to select projects that are part of a larger effort. The plan will be "multi-revenue source focused" so that lower tier projects in less important areas will still be part of the strategy and still be considered for funding prioritization from a variety of sources other than the Salmon Recovery Funding Board (i.e., National Fish and Wildlife Foundation, local cities and counties, and other agencies and programs). Typical capital project sponsors in the Snohomish River basin include Snohomish and King counties, Tulalip Tribes, cities of Seattle and Everett, Washington Trout, Stilly-Snohomish Fisheries Enhancement Task Force, Cascade Land Conservancy, and conservation districts. The strategy may guide allocation of additional grant sources such as a new National Fish and Wildlife Foundation/SRFB Community Salmon Fund pilot project in the Snohomish River basin.

The plan will be available on the Snohomish County website so that it is easily accessible.

Tools and resources that will be used to implement the project strategy: Staff expertise from these implementing agencies and organizations will include habitat and fisheries biologists, planners, and engineers. Each agency or organization is expected to select the implementation tools that work best for them and the specific project. For example, tools could include GIS analysis, standard engineering practices for design and construction, use of community volunteers, grant funds, community involvement and outreach about individual projects (such as one-on-one visits and community meetings), and a variety of land purchase methods (i.e., fee simple, conservation easements, leases, etc.).

III. INTERIM STRATEGY

The strategy divides the 63 sub-basins into strategy groups, presents recovery hypotheses, and identifies and ranks actions both among the sub-strategy groups and within individual sub-basins. More detail about how sub-basin strategy groups, hypotheses, and action priorities were developed is in Appendix B and the *Ecological Analysis for Salmonid Conservation.* Guidance on using the interim strategy and details of each sub-basin strategy group follow an overview of the components listed below.

Strategy components

Sub-basin Strategy Groups. Like sub-basins are grouped based on three characteristics: geo-spatial class (location), use and potential use by Chinook and bull trout, and the condition of watershed processes (hydrology, riparian, and sediment). Each sub-basin strategy group will have a unique role in the basin recovery strategy. While there is substantial overlap in habitat use by Chinook, bull trout, and coho, coho salmon spawn and rear more broadly throughout the basin and in smaller streams. Sub-basins that have high and moderate use by coho are identified within each strategy group. Strategy groups are shown in Table 1 and Figure 1. Many of the sub-basins have focus reaches and the recommended actions may be targeted at specific reaches.[1]

Hypotheses. Hypotheses help to guide the development of an overall strategy for recovering salmon. They provide estimates as to how improvements in habitat condition and watershed processes will lead to improvements in salmon population. In the Snohomish, there is a basin-wide hypothesis (see Appendix B) and sub-basin strategy group hypotheses.

On-the-ground actions. Using the hypotheses, eleven types on-the-ground actions to improve habitat conditions, and in turn the viability of salmonid populations, are proposed and ranked among sub-basin strategy groups and within individual sub-basins. Additional actions along small streams are recommended in areas where coho salmon spawn and rear. It important to remember that the Forum has not yet discussed how the on-the-ground actions should be prioritized and the mix of how these could be accomplished through capital projects, regulations, and incentive programs.

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[1] Primary focus reaches are those that were identified in the NTAA as Chinook "focus areas" that fall within high use and/or high potential use sub-basins identified through the EASC analysis. If a "focus area" was not identified within the sub-basin in the NTAA, then all the EDT reaches within the sub-basin are identified as focus reaches. Key spawning reaches for bull trout in the Upper North Fork Skykomish and Foss River sub-basins that were identified by WDFW are also included as primary focus reaches. Secondary focus reaches are Chinook reaches that were identified for the EDT analysis that was commissioned by the Tulalip Tribes. While these reaches encompass the vast majority of Chinook spawning and rearing, it should be noted that Chinook occur on a limited basis outside this range. Thus, the absence of an EDT reach should not be interpreted as meaning that Chinook are not present within other reaches or sub-basins. Maps produced by the Washington State Conservation Commission as part of the WRIA 7 Limiting Factors Analysis report (2002) provide a more comprehensive representation of known Chinook distribution.

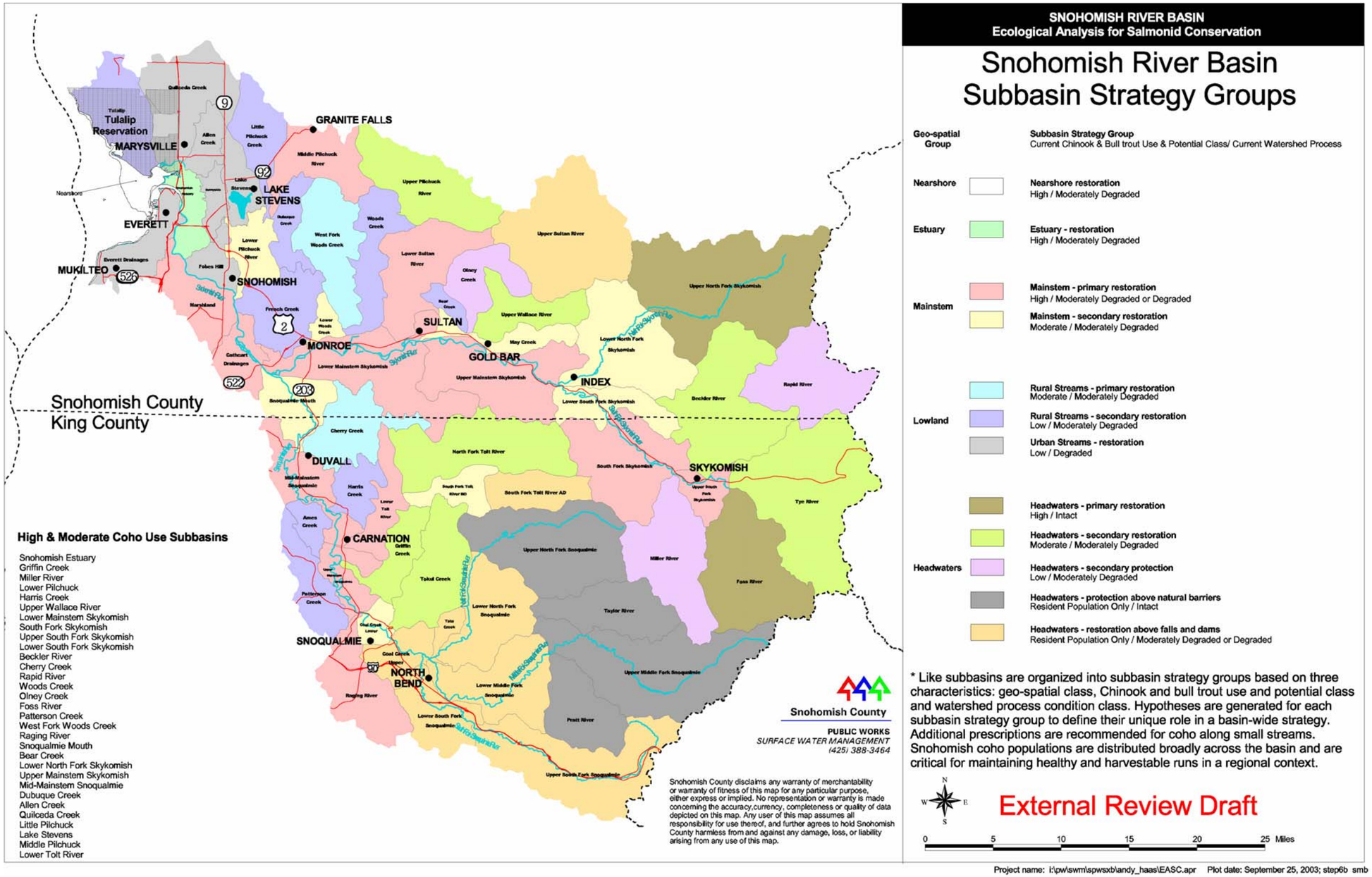
Table 1. Sub-basin Strategy Groups

Geo-spatial group	Sub-basin Strategy Group	Use/watershed condition	Recovery Need
Nearshore	Nearshore	High use/Moderately degraded	Substantial improvement
Estuary	Estuary	High use/Degraded	Substantial improvement
Mainstem	Primary restoration	High use/Moderately degraded or degraded	Substantial improvement
	Secondary restoration	Moderate use/Moderately degraded	Moderate improvement
Lowland Tributaries	Rural streams-Primary restoration	Moderate use/Moderately degraded	Moderate improvement
	Rural streams-Secondary restoration	Low Use/Moderately degraded	Minor improvement
	Urban streams-restoration	Low Use/Degraded	Maintain existing habitat
Headwaters	Headwaters-Primary protection	High Use/Intact	Maintain existing preservation
	Headwaters-Primary restoration	Moderate Use/Moderately degraded	Moderate improvement
	Headwaters-Secondary protection	Low use/Intact	Maintain
	Headwaters-Protection above natural barriers	Resident population only/Intact	Maintain
	Headwaters-restoration above falls and dams	Resident population only/Moderately degraded	Moderate improvement

Recovery Need. This is the general recovery direction that is needed for each strategy group.

General Strategy. This identifies the overall type of actions for each group.

Figure 1. Map of Sub-basin Strategy Groups



How to use the interim strategy

Project sponsors can use the sub-basin strategy groups to help determine the types of projects to pursue and how projects are likely to score in comparison with others. Sponsors may also want to refer to Appendix B and/or the *Ecological Analysis for Salmonid Conservation* for detail about the action priorities. All of the citations for the following section are in the *Ecological Analysis for Salmonid Conservation*.

When selecting projects, sponsors should keep in mind that capital projects in the nearshore, estuary, and mainstem primary restoration strategy groups are likely to score the highest because preliminary modeling shows that this is where the largest fish population gains are likely to occur. For the Salmon Recovery Funding Board, Chinook and bull trout projects will score higher than coho projects because the Board prioritizes listed salmon species. The Salmon Recovery Funding Board is likely to fund the top-tier actions in top-tier basins.

Actions are listed by priority groups and in priority sequence. First-priority actions will score better than second- or third-priority actions. The top sequenced actions will score better than those further down on this list. For example, in the Mainstem Primary Restoration strategy group, projects that protect existing habitat will typically score higher than a culvert removal even though both actions are a top priority for the sub-basin strategy group. However, a culvert removal project with exceptional habitat benefits could score higher than an acquisition with limited habitat benefits.

Sponsors should also refer to Tables B-1 and B-2 in Appendix B to help identify the most appropriate project for a particular sub-basin. The sub-strategy group pages can help sponsors determine a particular project will score in comparison with other types across the basin. Sponsors should also consult Table B-2 in Appendix B to identity priority projects within a sub-basin strategy group. For example, in the Lower Mainstem of the Skykomish River, habitat preservation is more important than culvert removal. In the Upper Mainstem Snoqualmie River, habitat preservation and culvert removal are of equal importance.

If sponsors have questions about the location of a specific focus reach(es), they should contact Snohomish County as the lead entity. The focus reaches are not shown on Figure 1 because the scale of the figure makes them difficult to see or use.

For the Fifth Round of the SRFB, the Forum requested to see a demonstration restoration project on farmland. This direction can also apply to the Community Salmon Fund pilot program. Maintaining agricultural viability in the Snohomish River basin is important to the Forum and the broader community. Agriculture is also a important land use along the river mainstems. A demonstration project will help build trust that farming and salmon recovery are compatible, if not mutually beneficial.

Sponsors should also use some of the general capital guidance (i.e., work only with willing landowners) that was developed for the *Near Term Action Agenda*. The relevant sections follow the sub-basin strategy groups.

Sub-basin Strategy Group: Nearshore

- **Geo-spatial class:** Nearshore**; Sub-basins:** Nearshore
- **Chinook use and potential use classification:** High
- **Watershed Process Condition:** Moderately degraded
- **Coho use:** High
- **Recovery need:** Substantial improvement
- **General strategy:** Habitat/process restoration

Description. The nearshore area encompasses the marine waters of Puget Sound out to a depth of 30 meters (photic zone) from Mukilteo to Kayak Point, as well as the corresponding shorelines and upland areas to the top of coastal bluffs. The waterbodies in the nearshore are Port Gardner, eastern Possession Sound, southern Port Susan, the mouth of the lower Snohomish River channel, the west shore of Jetty Island, and Hat (Gedney) Island. Hydrology in this sub-basin is driven by tidal circulation. Land use is residential, commercial, and industrial. The nearshore provides critical habitat for multiple life history stages of Chinook and bull trout, and spawning habitat for forage fish that lay their eggs in eelgrass and on the beach. Nearshore areas that contain eelgrass rank high for habitat quality and warrant protection.

Sediment delivery and transport, riparian conditions, and shoreline conditions have been extensively modified in the nearshore environment, most notably as a result of the Burlington Northern railroad and also as a result of bulkheads, riprap, piers, and dredging. These modifications have degraded upper beach habitat used by forage fish for spawning and reduced low gradient, low energy environments used by salmonids (SBSRTC 2002, Haring 2002). Sediments in portions of the East Waterway contain high levels of toxic metals and organic chemicals that do not meet State of Washington sediment quality standards (SBSRTC 2002).

<u>Current Habitat Conditions Highlights</u>

- 31% of the shoreline has intact riparian conditions.
- 60% of the shoreline is in natural condition. Extensive bank armoring has increased wave action, causing a shift in substrate size and vegetation communities.
- 50-75% of feeder bluffs, a source of beach replenishment, have been isolated.
- The State Department of Ecology's (DOE) 303d list identifies numerous water quality problems.

Recovery Role Hypothesis. Additional restoration of the Puget Sound nearshore environment was identified in the preliminary Ecosystem Diagnosis and Treatment (EDT) analysis as necessary to bridge the gap between the population performance levels under modeled scenarios and the Shared Strategy planning range. Sensitivity analysis of

the SHIRAZ model indicates that improvements in juvenile nearshore survival will have a significant positive impact. Reducing the extent of the modifications in sediment delivery and transport, riparian conditions, and shoreline conditions will provide a significant improvement in productivity and juvenile capacity.

Recommended Actions

First Priority

1. Preservation - i.e., protect areas of undeveloped shoreline, retain forest cover, prevent fill or dredging within the photic zone.
2. Restore shoreline conditions – i.e., remove armoring, lessen slopes of armored banks, use bioengineering in place of riprap.
3. Restore sediment processes – i.e., remove barriers to sediment transport, increase connectivity between coastal bluffs and the marine environment.
4. Riparian enhancement.

Second Priority

1. Address water quality impacts – i.e., fix leaking septic systems, implement farm plans, correct illicit discharges, remove contaminated sediment.

Other Actions (not prioritized)

- Control invasive species.

Sub-basin Strategy Group: Estuary

- **Geo-spatial classification**: Estuary**; Sub-basins in this group:** Estuary
- **Chinook/bull trout use and potential classification**: High
- **Watershed process condition**: Degraded
- **Coho use**: High
- **Recovery need:** Substantial improvement
- **General strategy**: Habitat/process restoration

Description. The Snohomish River Estuary includes the Snohomish River mainstem, three distributary sloughs, and marshes between Possession Sound and the divergence of Ebey Slough from the mainstem. The hydrology of this sub-basin is driven by tidal circulation. Land use is agricultural, residential, commercial, and industrial. The estuary, a highly productive and diverse environment, provides unique and critical habitat for Chinook and other salmonids for rearing and making the fresh-to-saltwater transition (smoltification). Bull trout overwinter and forage in the estuary as well.

Levees that have disconnected the Snohomish River from tidelands and marshes have dramatically altered the hydrology of the estuary, resulting in loss of historic marsh, blind tidal channels, and blind tidal sloughs, although recent natural and intential actions have restored several hundred acres of these habitats (City of Everett and Pentec 2000). Extensive diking, riparian clearing, and wood removal have altered habitat conditions in the channel margins (Snohomish Basin Salmon Recovery Forum 2001). In addition to loss of habitat, other problems caused by dikes, tidegates, pump stations, and dredging are restricted fish access within distributary sloughs and to tributary creeks; altered sediment deposition; and loss of riparian vegetation. Degraded water quality is manifested in high temperatures, low dissolved oxygen levels, and high fecal coliform counts that do not meet State of Washington water quality standards. Estuarine sediments contain high levels of toxic metals and organic chemicals that do not meet State of Washington sediment quality standards (Snohomish Basin Salmonid Recovery Technical Committee 2002).

<u>Current Habitat Conditions Highlights</u>

- 85% of the historic tidal marsh habitat downstream of Ebey Slough has been disconnected by diking and tide-gates.
- Almost two-thirds (44 miles) of the channel edge along the mainstem and distributary sloughs has been diked or armored.
- Only 11% of the channel edge has intact riparian forest (note: 1/3 of estuary was never forested).
- DOE's 303d list identifies numerous water quality problems.
- 9% of the sub-basin is impervious surfaces.

Recovery Role Hypothesis. Preliminary modeling with EDT identified the estuary as one of the most important places to focus preservation and restoration actions for both Chinook populations. The loss of 85 percent of the historic tidal marsh area, loss of edge habitat complexity along major slough channels, and habitat fragmentation have depressed population performance. Addressing these problems will provide significant improvements in abundance, productivity and diversity for Chinook and bull trout populations, as well as for other species.

Recommended Actions

First Priority

1. Preservation – i.e., protect existing tidal marsh, maintain restoration opportunities through protection of properties with high potential to be restored to tidal marsh.
2. Improve fish passage and tidal exchange on tide-gated streams entering the estuary.
3. Reconnect off-channel habitats – i.e., restore tidal marsh, reconnect large blind tidal channels and distributary sloughs isolated behind dikes, improve connectivity among sloughs and marsh habitats.
4. Restore shoreline conditions – i.e., set back dikes from the channel edge.
5. Riparian enhancement.

Second Priority

1. Address water quality impacts – i.e., prevent illicit discharges.
2. Instream structural enhancement – i.e., increase large woody debris (LWD) and edge habitat conditions in marshes and along the edges of mainstem and distributary slough channels.

Other Actions (not prioritized)

- Reduce log rafting – i.e., buy log-rafting rights from critical areas.

Sub-basin Strategy Group: Mainstem Primary Restoration

- **Geo-spatial classification**: Mainstems**; Sub-basins in this group:** Skykomish River - Lower Mainstem, Skykomish River - Upper Mainstem, Skykomish River - South Fork, Skykomish River - Upper South Fork, Sultan River - Lower, Snoqualmie River - Mid Mainstem, Snoqualmie River - Upper Mainstem, Pilchuck River - Middle, Upper Snohomish/Cathcart, Lower Snohomish/Marshland, Tolt River - Lower, and Raging River
- **Chinook/bull trout use and potential classification:** High
- **Watershed process condition:** Moderately Degraded or Degraded
- **Coho use:** High: Tolt River-Lower; Moderate: Skykomish River - Upper Mainstem, Snoqualmie River - Upper Mainstem, Pilchuck River – Middle, Raging River; Known presence: Skykomish River - Lower Mainstem, Skykomish River - South Fork, Skykomish River - Upper South Fork, Sultan River - Lower, Snoqualmie River - Mid Mainstem, Upper Snohomish/Cathcart, Lower Snohomish/Marshland
- **Recovery need:** Substantial improvement
- **General strategy:** Habitat/process restoration

Description. The waterbodies in this category are large rivers with floodplains in the mid and lower basin. The rivers flow west/northwest out of the Cascade Mountains through broad alluvial valleys of the Puget Lowland. High monthly flows occur from November through January due to winter rains and increased meltwater from rain-on-snow events, and from May through June due to high elevation snowmelt. Annual low flows occur in August and September. Land use is predominantly agricultural and rural residential with some urban and commercial development in cities along the rivers.

This sub-basin strategy group contains the core Chinook spawning and freshwater rearing in the Snohomish River basin. Bull trout exhibiting fluvial and anadromous life history strategies use mainstems for rearing, overwintering habitat for subadults, and adult foraging. Mainstems are also migratory corridors for all salmonid species (Pentec Environmental and NW GIS 1999, Snohomish Basin Salmon Recovery Forum 2001, Haring 2002).

Dikes, bank armoring, roads, railroads, and bridges confine these mainstem rivers, disconnect off-channel habitat, reduce edge habitat complexity, and increase peak flows downstream. Riparian forests have also been substantially reduced. Other habitat problems in this sub-basin strategy group include excessive erosion of streambanks, dearth of LWD, and degraded water quality, i.e., high temperature, low dissolved oxygen, high fecal coliform counts, and high levels of toxic metals (Snohomish Basin Salmonid Recovery Technical Committee 2002, Solomon and Boles 2002, Haring 2002).

Current Habitat Conditions Highlights

- Riparian forest conditions are intact along 57% of mainstem channel edge.

- Access to 57 miles of habitat in small tributary stream within the sub-basin strategy group is known to be restricted or blocked. An additional 49 miles of known blocked stream habitat is located within ½ miles of focus reaches for Chinook within the sub-basin strategy group.
- 82% (994 acres) of off-channel sloughs and ponds are disconnected.
- Several thousand acres of palustrine wetland has been disconnected or drained.
- 67% of mainstem banks are in natural condition.
- 51% of the sub-basin strategy group has hydrologically mature forest.
- Under 4% of the sub-basin strategy group is impervious surfaces.
- Channels have low levels of LWD and LWD jams.

Recovery Role Hypothesis. Along with the estuary and nearshore environments, preliminary modeling efforts have identified sub-basins within this group as having the highest potential gains with restoration and highest potential losses if further degradation occurs. Current spawning capacity is thought to be adequate for recovery. While spawning habitat quality has been impacted in some locations by altered sediment and flow regimes, the loss of rearing habitat quantity and quality is the primary factor affecting population performance. Setting back and removing armoring, restoring access to isolated habitats, replanting riparian forests, and implementing agricultural best management practices (BMPs) will provide the greatest returns in population performance of any restoration actions in the freshwater environment. Major improvements in habitat conditions within this sub-basin strategy group will be necessary to produce an outcome in terms of abundance and productivity within the Shared Strategy planning range.

Recommended Actions

<u>First Priority</u>

1. Preservation (along focus reaches) – i.e., protect intact riparian forest, protect oxbows, prevent floodplain development or fill, maintain opportunities for rivers to migrate within their channel migration zones.
2. Preservation to support hydrologic and sediment processes – i.e., protect wetland, protect floodplains, and protect forest retention.
3. Remove human-made instream barriers along or adjacent to priority reaches – i.e., fix blocking culverts, wiers, pump-stations, flood-gates and tide-gates to provide access by salmonids.
4. Reconnect off-channel habitats – i.e., set back or remove dikes to allow for channel migration and to reconnect off-channel features such as oxbows and side channels.
5. Restore shoreline conditions – i.e., remove rip-rap, incorporate LWD into armored banks.

6. Restore hydrologic and sediment processes (for peak flow and base flow) – i.e., increase wetland functions and values, reconnect floodplains, reforestation, and remove impervious surfaces.
7. Riparian enhancement.

Second priority

1. Address water quality impacts – i.e., prevent illicit discharges, implement agricultural BMPs and farm plans.
2. Instream structural enhancement – i.e., installation of engineer log jams.

Other Actions (not prioritized)

- Culvert replacement on small streams– i.e., prioritize and replace blocking culverts on coho streams based on available habitat upstream. Coho use has been documented at high and moderate levels on index reaches within the Upper Mainstem Skykomish, Upper Mainstem Snoqualmie, Middle Pilchuck, Lower Tolt, and Raging River sub-basins. Other streams may also have high potential gains for coho that has not yet been documented.

Sub-basin Strategy Group: Mainstem Secondary Restoration

- **Geo-spatial classification**: Mainstems**; Sub-basins**: May Creek/Lower Wallace, Skykomish River - Lower North Fork, Skykomish River - Lower South Fork, Woods Creek - Lower, Snoqualmie River Mouth, Tolt River - South Fork Below Dam, Pilchuck River – Lower; Coal Creek - Lower
- **Chinook/bull trout use and potential class**: Moderate
- **Watershed process condition**: Moderately Degraded
- **Coho use**: High: Skykomish River - Lower North Fork, Snoqualmie River Mouth; Moderate: Skykomish River - Lower South Fork, and Known presence: May Creek/Lower Wallace, Woods Creek – Lower, Tolt River - South Fork Below Dam, Pilchuck River – Lower; Coal Creek - Lower
- **Recovery need**: Moderate Improvement
- **General strategy**: Habitat/process restoration

Description. These sub-basins contain small rivers with floodplains and large mainstem river reaches that have lower levels of current Chinook spawning or spawning potential relative to mainstem rivers in the primary group. High monthly flows occur from November through January due to winter rains and increased meltwater from rain-on-snow events, and from May through June due to high elevation snowmelt. Annual low flows occur in August and September. Land use is a mix of rural residential, agriculture and forestry with some urban and commercial development and transportation corridors in cities along the rivers.

Sub-basins in this strategy group contain satellite Chinook spawning and rearing areas, as well as spawning and rearing habitat for other salmonids and presumed foraging habitat for bull trout (Pentec Environmental and NW GIS 1999, Snohomish Basin Salmon Recovery Forum 2001, Haring 2002). Habitat problems include decreased fish passage due to human-made barriers such as culverts (primarily affecting coho); loss of floodplain connectivity due to dikes, bank hardening, roads, railroads, and bridges; excessive erosion of streambanks; and loss of riparian vegetation. A paucity of LWD and degraded water quality due to high temperature, nutrient levels, and fecal coliform counts are problems in some of these waterbodies (Snohomish Basin Salmonid Recovery Technical Committee 2002, Haring 2002).

Current Habitat Conditions Highlights

- Riparian forest conditions are intact along 69% of mainstem channel edge.
- 85% (588 acres) of off-channel sloughs and ponds are disconnected.
- 82% of mainstem banks are in natural condition.
- The sub-basin strategy group contains 53% mature forest cover.
- Total impervious area is 2.6%.

- Channels have low levels of LWD and LWD jams.
- Water quality is degraded due to high temperature, nutrient levels, and fecal coliform counts in some areas.

Recovery Role Hypothesis. Sub-basins in the mainstem – secondary restoration strategy group have similar habitat issues to the previous group. Although actions within this groups are not likely to achieve as great of a response in terms of Chinook abundance and productivity, restoring riparian forests and floodplain connectivity, correcting fish passage barriers, and reducing the negative impacts of urbanization and forest clearing within these areas will provide significant benefits in terms of Chinook salmon viability, particularly for spatial structure and diversity. It should also be noted that low flows are thought to limit production in the Lower – Pilchuck sub-basin, and may also be a problem in other small rivers. Actions within these sub-basins provide direct and downstream benefits for all salmonid species. Many core Chinook spawning reaches occur directly downstream. Without recovery actions in this group, it will be unlikely that population performance will recover to the target levels identified by Shared Strategy.

Recommended Actions

First Priority

1. Preservation to support hydrologic and sediment processes – i.e., large-scale actions to retain wetlands, floodplains, and forest cover.
2. Restore hydrologic and sediment processes (for peak flow and base flow) – i.e., increase wetland functions and values, reconnect floodplains, reforestation, remove impervious surfaces.

Second Priority

1. Preservation (along focus reaches) – i.e., protect intact riparian forest, protect oxbows, prevent floodplain development or fill, maintain opportunities for rivers to migrate within their channel migration zones.
2. Remove human-made instream barriers along or adjacent to priority reaches – i.e., fix blocking culverts, wiers, pump-stations and flood-gates to provide access by salmonids.
3. Restore shoreline conditions – i.e., remove rip-rap, incorporate LWD into armored banks.
4. Riparian enhancement.

Third Priority

1. Address water quality impacts – i.e., prevent illicit discharges, implement agricultural BMPs and farm plans.
2. Instream structural enhancement – i.e., install engineered log jams.

Other Actions (not prioritized)

- Culvert replacement on small streams– i.e., prioritize and replace blocking culverts on coho streams based on available habitat upstream. Skykomish River – Lower North Fork, Skykomish River – Lower South Fork, Snoqualmie River – Mouth sub-basins contain index reaches that have high and moderate coho use. Other streams may also have high potential for coho that has not been documented.

Sub-basin Strategy Group: Rural streams – Primary Restoration

- **Geo-spatial class:** Lowland tributaries**; Sub-basins**: Woods Creek - West Fork, Cherry Creek
- **Chinook/bull trout use and potential classification:** Moderate
- **Watershed process condition**: Moderately degraded
- **Coho use**: High: Cherry Creek; Moderate: Woods Creek – West Fork
- **Recovery need**: Moderate improvement
- **General strategy:** Habitat/process restoration

Description. The West Fork of Woods Creek and Cherry Creek are large rural tributaries to the Skykomish River and Snoqualmie River, respectively. Mean monthly flows in these creeks increase from September through January as rainfall increases, and then decrease to a low point in August (Pentec Environmental and NW GIS 1999). Land use is agricultural and rural residential in the lower part of the sub-basins and forestry upstream. These waterbodies contain or have the potential to support moderate levels of Chinook spawning and are also important for coho spawning and rearing. There is presumed foraging and overwintering habitat for bull trout as well.

Habitat problems include decreased fish passage due to human-made barriers such as culverts; increased bank erosion and deposition of fine sediments in spawning gravel (Woods Creek – West Fork only); degraded water quality due to high temperature and fecal coliform counts that violate State of Washington water quality standards; immature or no riparian vegetation along agricultural lands; paucity of LWD; loss of wetlands; and loss of floodplain connectivity due to dikes (Cherry Creek only) (Snohomish Basin Salmonid Recovery Technical Committee 2002, Haring 2002).

Current Habitat Conditions Highlights

- Riparian forest conditions are intact along 62% of mainstem channel edge.
- Access to over 14 miles of habitat in small tributary streams is known to be restricted or blocked. Access is further known to be restricted or blocked to 1.6 miles of stream within ½ miles of focus reaches for Chinook. The known culvert blockages are primarily in Cherry Creek.
- 129 acres of off-channel habitat is disconnected.
- The sub-basin strategy group contains 45% mature forest cover.
- Impervious surfaces are approximately 1%.
- Channels contain low levels of LWD loading and LWD recruitment potential.

Recovery Role Hypothesis. of the lowland tributary class, these sub-basins have the highest potential to support Chinook salmon. They have a similar level of importance as part of basinwide strategy to mainstem – secondary restoration group. Although not as

critical as in the mainstem -primary restoration class and estuary, restoring riparian forests, addressing sediment problems, correcting fish passage barriers, restricting livestock access to streams, reconnecting isolated habitats, and restoring habitat complexity within this group will be important for Chinook population viability. Maintaining and restoring habitat within these areas will be particularly important for spatial structure and diversity. Actions in this sub-basin strategy group provide direct and downstream benefits to all salmonid species.

Recommended Actions

First Priority

1. Preservation to support hydrologic and sediment processes – i.e., large-scale actions to retain wetlands, floodplains, and forest cover.
2. Restore hydrologic and sediment processes (for peak flow and base flow) – i.e., restore wetland functions and values, reforestation, remove impervious surfaces.

Second Priority

1. Preservation (along focus reaches) – i.e., protect intact riparian forest, floodplains and inner gorges, and maintain opportunities for rivers to migrate within their channel migration zones.
2. Remove human-made instream barriers along or adjacent to priority reaches – i.e., fix blocking culverts to provide access by salmonids.
3. Restore shoreline conditions – i.e., remove rip-rap, incorporate LWD into armored banks.
4. Riparian enhancement.

Third Priority

1. Address water quality impacts – i.e., prevent illicit discharges, implement agricultural BMPs and farm plans.
2. Instream structural enhancement – i.e., install engineered LWD.

Other Actions

- Culvert replacement on small streams – i.e., prioritize and replace blocking culverts on coho streams based on available habitat upstream. Cherry Creek has been identified as a high-use coho sub-basin and Woods Creek – West Fork a moderate use sub-basin.

Sub-basin Strategy Group: Rural streams – secondary restoration

- **Geo-spatial classification:** Lowland tributaries; **Sub-basins:** Bear Creek, Woods Creek, Ames Creek, Harris Creek, Patterson Creek, Dubuque Creek, Little Pilchuck Creek, French Creek, Tulalip/Battle Creeks
- **Chinook/bull trout use and potential classification**: Low
- **Watershed process condition:** Moderately degraded
- **Coho use:** Moderate: Woods Creek, Harris Creek, Patterson Creek, Dubuque Creek; Known presence: Bear Creek, Ames Creek, Little Pilchuck Creek, French Creek; None: Tulalip/Battle Creeks
- **Recovery need:** Minor improvement
- **General strategy:** Process restoration

Description. These creeks are smaller rural tributaries to mainstem rivers. Mean monthly flows increase from September through January as rainfall increases, and then decrease to a low point in August (Pentec Environmental and NW GIS 1999). This group of sub-basins is undergoing rapid development, with increasing conversion of forested land to agricultural, rural residential, and suburban residential land uses. The creeks are used by Chinook at low levels, but are important for coho salmon spawning and rearing. Bull trout are presumed to forage in many of the sub-basins as well.

Habitat problems in this group include decreased fish passage due to human-made barriers such as culverts, dams, and pump station; increased bank erosion and deposition of fine sediments in spawning gravel; degraded water quality due to high temperature, low dissolved oxygen, high nutrient levels, high copper and lead levels (Patterson Creek only); and high fecal coliform counts that violate State of Washington water quality standards; loss of riparian vegetation; paucity of LWD; loss of floodplain wetlands; and loss of floodplain connectivity/function due to levees, bank armoring, channelization/ditching, and road encroachment (Snohomish Basin Salmonid Recovery Technical Committee 2002; Haring 2002; Solomon and Boles 2002).

Current Habitat Conditions Highlights

- Riparian forest conditions are intact along 60% of mainstem channel edge.
- 533 acres of off-channel habitat are disconnected.
- The sub-basin strategy group contains 36% mature forest cover.
- Impervious surfaces are 3.3%.
- Low levels of LWD loading and LWD recruitment potential.
- Significant erosion and deposition of fine sediments in spawning gravel
- Numerous 303d listings for water quality.

Recovery Role Hypothesis. Sub-basins within this group generally provide important habitat to coho salmon, and to a lesser extent, salmonid species listed under the ESA. Protecting and restoring watershed processes through forest retention and limiting impervious surface is important for multi-species protection and to create and maintain suitable conditions downstream for Chinook spawning and rearing. Addressing barriers across this sub-basin strategy group, and in particular, at the mouth of French Creek, Tulalip Creek, and Battle Creek, would provide substantial benefits for wild salmonids.

Recommended Actions

First Priority

1. Preservation to support hydrologic and sediment processes – i.e., large-scale actions to retain wetlands, floodplains, and forest cover.
2. Restore hydrologic and sediment processes (for peak flow and base flow) – i.e., restore wetland functions and values, reforestation, remove impervious surface.

Second Priority

None listed

Third Priority

1. Preservation (along focus reaches) – i.e., protect intact riparian forest, floodplains and inner gorges, and maintain opportunities for rivers to migrate within their channel migration zones.
2. Remove human-made instream barriers along or adjacent to priority reaches – i.e., fix blocking culverts.
3. Restore shoreline conditions – i.e., remove rip-rap, incorporate LWD into armored banks.
4. Riparian enhancement.
5. Address water quality impacts – i.e., prevent illicit discharges, agricultural BMPs, farm plans.

Fourth Priority

1. Instream structural enhancement – i.e., installation of LWD.

Other Actions (not prioritized)

- Culvert replacement on small streams – i.e., prioritize and replace blocking culverts on coho streams based on available habitat upstream. Woods Creek, Harris Creek, Patterson Creek, and Dubuque Creek sub-basins contain index reaches with high or moderate coho use. Other creeks such as French Creek, and Tulalip and Battle creeks have high potential if barriers at the mouths of these sub-basins are addressed.

Sub-basin Strategy Group: Urban Streams – restoration

- **Geo-spatial Classification:** Lowland tributaries; **Sub-basins:** Lake Stevens Drainages, Everett Coastal Drainages, Fobes Hill, Quilceda Creek, Allen Creek, Sunnyside Drainages
- **Chinook/bull trout use and potential classification**: Low
- **Watershed process condition**: Degraded
- **Coho use**: Moderate: Quilceda Creek; Known presence: Lake Stevens Drainages, Everett Coastal Drainages, Fobes Hill, Allen Creek, Sunnyside Drainages
- **Recovery need**: Maintain current habitat level and functions
- **General strategy**: Habitat restoration

Description. These Puget lowland sub-basins flank the Snohomish River estuary and have highest levels of land development and development pressure in the basin. Land use is predominantly urban and rural residential development. There is little to no Chinook spawning in the waterbodies, but the lower reaches provide rearing habitat for Chinook. Coho salmon and cutthroat trout use these waterbodies as well (Pentec Environmental and NW GIS 1999).

Habitat problems in this group include decreased fish passage due to human-made barriers such as culverts; increased bank erosion and deposition/embeddedness of fine sediments in spawning gravel; increased peak flows due to high percentage effective impervious area; degraded water quality due to high temperature, low dissolved oxygen, high nutrient levels, high lead levels (Everett Coastal Drainages only), and high fecal coliform counts that do not meet State of Washington water quality standards; loss of riparian vegetation and floodplain wetlands; paucity of LWD; and loss of floodplain connectivity due to dikes, bank armoring and stream channelization/ditching (Snohomish Basin Salmonid Recovery Technical Committee 2002, Haring 2002).

Current Habitat Conditions Highlights

- Riparian forest conditions are intact along 20% of mainstem channel edge.
- Access to 38 miles of habitat in small tributary stream within the sub-basin strategy group is known to be restricted or blocked, particularly within Quilceda Creeks. Access is known to be restricted to an additional 2.6 miles of habitat within ½ mile of Chinook focus reaches (Quilceda Creek).
- The sub-basin strategy group contains 13% mature forest cover.
- Impervious surfaces are over 22%.
- Channels contain low levels of LWD loading and LWD recruitment potential.
- DOE's 303d list identifies multiple water quality problems.

Recovery Role Hypothesis. Watershed processes have been substantially altered within this sub-basin strategy group. Managing these sub-basins to prevent downstream impacts

will be adequate for a basinwide Chinook strategy if substantial restoration efforts are undertaken in other areas. Particular care should be taken to protect habitat quality (i.e., water quality, temperature, sediment transport) and diversity where creeks enter the estuary and nearshore environment. Maintaining and restoring riparian forests and fixing culverts within this group may allow these waterbodies to continue to support small populations of resident trout, coho, and occasionally Chinook salmon. Quilceda Creek and Lake Stevens drainages, exceptions within this group due to abundant wetlands, still support significant coho production. With additional protective measures to retain remaining wetlands, riparian forests, and forest cover, these two sub-basins can support healthy coho runs in perpetuity.

Recommended Actions

First Priority
None listed

Second Priority
None listed

Third Priority
1. Preservation (along focus reaches) – i.e., protect intact riparian forest, floodplains and inner gorges, and maintain opportunities for rivers to migrate within their channel migration zones.
2. Remove human-made instream barriers along or adjacent to priority reaches – i.e., fix blocking culverts.
3. Restore shoreline conditions – i.e., remove rip-rap, incorporate LWD into armored banks.
4. Riparian enhancement.
5. Address water quality impacts – i.e., prevent illicit discharges, bio-filter surface water runoff from impervious surfaces.

Fourth Priority
1. Instream structural enhancement – i.e., install LWD.

Other Actions (not prioritized)
- Culvert replacement on small streams – i.e., prioritize and replace blocking culverts on coho streams based on available habitat upstream. Quilceda Creek and Lake Stevens sub-basins are the big coho producers within this sub-basin strategy group.

Sub-basin Strategy Group: Headwaters – Primary Protection

- **Geo-spatial classification:** Headwaters; **Sub-basins:** Skykomish River - Upper North Fork, Foss River
- **Chinook/bull trout use and potential class**: High
- **Watershed process conditions**: Intact
- **Coho use:** Known presence: Skykomish River - Upper North Fork, Foss River
- **Recovery need:** Moderate improvement
- **General strategy:** Maintain preservation of existing habitat and watershed process

Description. These sub-basins are located in the headwaters of the Skykomish River and are located almost entirely on federal lands. This sub-basin strategy group encompasses the primary spawning and rearing habitat for bull trout as well as critical habitat for Chinook. Bull trout spawning occurs in Foss River and North Fork Skykomish mainstems and in Goblin, Salmon, Troublesome and West Cady creeks (Upper North Fork Skykomish sub-basin) Access to the Foss River by anadromous salmonids is provided artificially. WDFW runs a trap and haul operation at Sunset Falls, a natural barrier on the South Fork Skykomish River. Watershed process conditions are intact.

Current Habitat Conditions Highlights

- The sub-basin strategy group contains 73% mature forest.
- Riparian forest conditions are 80% intact along Chinook and bull trout focus reaches.
- The Foss River mainstem has almost no bank armoring. The North Fork Skykomish is somewhat constrained by a Forest Service access road.
- Road density is less than one mile per square mile.
- Impervious area is essentially zero.
- Although not all reaches have optimal wood loading levels, overall, these basins have some of the highest levels found in the basin.

Recovery Role Hypothesis. Preservation of watershed process conditions n this sub-basin strategy group is critical for maintaining viable bull trout populations in the Snohomish River basin because it contains nearly all of the bull trout spawning in the basin. Protection of watershed processes also supports Chinook and coho spawning in the sub-basins and downstream. A few opportunities exist to improve conditions along channel edges, but generally the strategy is to preserve habitat that is functioning well.

Recommended Actions

First Priority

1. Preservation (along focus reaches) – i.e., protect intact riparian forest, protect multi-threaded channels, maintain opportunities for rivers to migrate within their channel migration zones.
2. Preservation to support hydrologic and sediment processes – i.e., large-scale actions to retain floodplains, wetlands, and forest cover.
3. Restore shoreline conditions – i.e., remove bank armor that is no longer needed along decommissioned roads.

Second Priority

1. Marine-derived nutrient enhancement – i.e., salmon carcass placement (NF Skykomish only).

Sub-basin Strategy Group: Headwaters – Secondary restoration

- **Geo-spatial Group:** Headwaters; **Sub-basins:** Griffin Creek, Tolt River - North Fork, Beckler River, Pilchuck River - Upper, Tokul Creek, Tye River, Waller River - Upper
- **Chinook/bull trout use and potential class:** Moderate
- **Watershed process conditions:** Moderately degraded
- **Coho use:** High: Griffin Creek; Known presence: Tolt River - North Fork, Beckler River, Pilchuck River - Upper, Tokul Creek, Tye River, Waller River - Upper
- **Recovery need:** Moderate improvement
- **General strategy:** Habitat/process restoration

Description. Upper to mid elevation streams and rivers drain into lower elevation rivers. High monthly flows occur from November through January due to winter rains and increased meltwater from rain-on-snow events, and in May through June due to snowmelt. Annual low flows occur in August and September. Located entirely or partially in the forest production zone, there are some forest and recreational land use impacts to these waters. Current Chinook use is low but with potential to support larger runs.

Current Habitat Conditions Highlights

- Riparian forest conditions are 79% intact along focus reaches.
- Mature forest cover is 69%.
- Impervious surfaces are less than 1%
- Average road density is 3.4 miles per square mile.

Recovery Role Hypothesis. Restoring watershed process is important for supporting spawning and rearing that occurs in these sub-basins and in downstream reaches. Significant opportunities also exist to improve spawning and rearing through the reconnection of habitat. Actions in these sub-basins will provide a response in terms of population performance on par with the rural streams – primary restoration strategy group and could have significant multi-species benefits.

Recommended Actions

First Priority

1. Preservation to support hydrologic and sediment processes – i.e., large-scale actions to retain floodplains, wetlands and forest cover.
2. Restore hydrologic and sediment processes (for peak flow and base flow) – i.e., restore wetland functions and values, reforestation, removal of impervious surface, decommissioning of forest roads.

Second Priority

1. Preservation (along focus reaches) – i.e., protect intact riparian forest, protect multi-threaded channels, maintain opportunities for rivers to migrate within their channel migration zones.
2. Remove human-made instream barriers along or adjacent to priority reaches – i.e., fix blocking culverts.
3. Reconnect off-channel habitats – i.e., reconnect side-channels isolated by forest service roads.
4. Restore shoreline conditions – i.e., remove bank armor that is no longer needed for decommissioned roads.
5. Riparian enhancement.

Third Priority

1. Address water quality impacts – i.e., increase shade to reduce temperatures.
2. Marine-derived nutrient enhancement.
3. Instream structural enhancement – i.e., LWD placement in select reaches with documented low levels of LWD and degraded riparian forest conditions.

Other Actions (not prioritized)

- Culvert replacement on small streams – i.e., prioritize and replace blocking culverts on coho streams based on available habitat upstream. The Griffin Creek sub-basin contains an index reach with moderate coho use. Other streams may also have high potential, but the extent of coho use has not been well documented.

Sub-basin Strategy Group: Headwaters – Secondary protection

- **Geo-spatial group**: Headwaters**; Sub-basins**: Miller River, Olney Creek, Rapid River
- **Chinook/bull trout current use and potential classification:** Low
- **Watershed process condition:** Intact
- **Coho use:** Known presence: Miller River, Olney Creek, Rapid River
- **Recovery need:** Preserve existing habitat and processes
- **General strategy:** Preservation

Description. Varied elevation streams and rivers in the Skykomish Watershed drain into low-elevation rivers. High monthly flows occur from November through January due to winter rains and increased meltwater from rain-on-snow events, and from May through June due to higher elevation snowmelt. Annual low flows occur in August and September. Located entirely (Miller, Rapid, and Tye Rivers) or partially (Olney Creek and Upper Wallace River) in the forest production zone, timber harvest is the predominant impact to the watershed although low levels of forestry are taking place currently. Current Chinook use is low (Snohomish Basin Salmonid Recovery Technical Committee 2002).

Current Habitat Conditions Highlights

- Riparian forest conditions are 84% intact.
- Mature forest cover is 76%.
- Impervious area is essentially zero.
- Average road density is 1.4 miles per square mile.

Recovery Role Hypothesis. Watershed process conditions are largely intact in this sub-basin strategy group. Preservation of intact watershed process conditions will help to maintain the conditions that support high-quality spawning and rearing habitat downstream in the Wallace River and mainstem Skykomish River. Many sub-basins in this group contain some of the most productive coho habitat in the Snohomish River basin; thus removal of human-made instream barriers is a priority.

Recommended Actions

First Priority

1. Preservation to support hydrologic and sediment processes – i.e., large-scale actions to retain floodplains, wetlands, and forest cover.

Second Priority

None listed

Third Priority

1. Preservation (along focus reaches) – i.e., protect intact riparian forest, protect multi-threaded channels, maintain opportunities for rivers to migrate within their channel migration zones.
2. Remove human-made instream barriers along or adjacent to priority reaches – i.e., fix blocking culverts.
3. Reconnect off-channel habitats – i.e., reconnect side-channels isolated by forest roads.
4. Restore shoreline conditions – i.e., remove bank armor that is no longer needed for decommissioned roads.
5. Address water quality impacts – i.e., increase shade.

Other Actions (not prioritized)

- Culvert replacement on small streams – i.e., prioritize and replace blocking culverts on coho streams based on available habitat upstream. Coho use is known, but the extent of use has not been well documented.

Sub-basin Strategy Group: Headwaters – protection above natural barriers

- **Geo-spatial Group**: Headwaters**; Sub-basins**: Snoqualmie River - Upper North Fork, Snoqualmie River - Upper Middle Fork, Pratt River, Taylor River
- **Use and potential classification**: Resident population only
- **Watershed process condition:** Intact
- **Coho use:** None
- **Recovery need:** Preserve habitat and processes
- **General strategy:** Preservation

Description. Middle elevation rivers in the Snoqualmie Watershed drain into low elevation rivers. High monthly flows occur from November through January due to winter rains and from May through June due to higher elevation snowmelt. Annual low flows occur in August and September. While located entirely in the forest production zone, timber harvest only occurs in the Upper North Fork Snoqualmie, as the other sub-basins are located in the Alpine Lakes Wilderness Area (Snohomish Basin Salmonid Recovery Technical Committee 2002). All of these sub-basins are located above Snoqualmie Falls; therefore the only native fish present are resident populations.

Current Habitat Conditions Highlights

- Mature forest cover is 73%.
- Impervious area is essentially zero
- Average road density is 1.2 miles per square mile.

Recovery Role Hypothesis. Watershed process conditions are largely intact within this sub-basin strategy group. Preservation of intact watershed process conditions will protect habitat for resident trout above Snoqualmie Falls and maintain the conditions that support high-quality spawning and rearing habitat for anadromous salmonids downstream in the mainstem Snoqualmie. Restoration opportunities exist, but are a lower priority because the majority of habitat is intact. Improving fish passage will increase the quantity of habitat available to resident trout.

Recommended Actions

First Priority

1. Preservation to support hydrologic and sediment processes – i.e., large-scale actions to retain floodplains, wetlands, and forest cover.

Second Priority
None listed

Third Priority
None listed

Fourth Priority
None listed

Fifth Priority
1. Instream structural enhancement – (i.e., LWD placement in moderately degraded areas of the Upper North Fork Snoqualmie sub-basin).

Sub-basin Strategy Group: Headwaters – restoration above falls and dams

- **Geo-spatial Group:** Headwaters**; Sub-basins**: Tolt River - South Fork above Dam, Sultan River - Upper, Snoqualmie River - Upper South Fork, Snoqualmie River - Lower Middle Fork, Tate Creek, Coal Creek - Upper, Snoqualmie River - Lower North Fork, Snoqualmie River - Lower South Fork
- **Use and potential classification:** Resident population only
- **Watershed process condition:** Moderately degraded
- **Coho use:** None
- **Recovery need:** Minor improvement
- **General strategy:** Process restoration

Description. Varied elevation streams and rivers in the Skykomish and Snoqualmie watersheds drain into low elevation rivers. High monthly flows occur from November through January due to winter rains and increased meltwater from rain-on-snow events, and from May through June due to higher elevation snowmelt. Annual low flows occur in August and September. Located entirely (South Fork Tolt River, Snoqualmie River-Lower North, Lower Middle, and Upper South Forks, Tate Creek, and Upper Coal Creek) or partially (Lower South Fork Snoqualmie and Upper Sultan River) in the forest production zone, timber harvest is the predominant impact to these sub-basins along with rural residential use in the lower levels of the sub-basins. These sub-basins have no anadromous salmonid use and two sub-basins (South Fork Tolt River and Upper Sultan River) are above dams, with the South Fork Tolt dam located above a natural anadromous fish barrier (Snohomish Basin Salmonid Recovery Technical Committee 2002). Current native fish use is by resident populations. Watershed process conditions are moderately degraded within this sub-basin strategy group (Haring 2002).

Current Habitat Conditions Highlights

- Mature forest cover is 65%.
- Average impervious surfaces are slightly higher than 1%, although over 5% in Upper Coal Creek and Snoqualmie River Lower South Fork.
- Average road density is 32 miles per square mile.

Recovery Role Hypothesis. Reforestation, decommissioning of forest roads, and riparian enhancement will help to improve instream conditions in focus reaches downstream, thereby contributing to improvements in population performance. Improving fish passage will increase the quantity of habitat available to resident trout.

Recommended Actions

First Priority

1. Preservation to support hydrologic and sediment processes – i.e., large-scale actions to retain floodplains, wetlands, and forest cover.
2. Restore hydrologic and sediment processes (for peak flow and base flow) – i.e., restore wetland functions and values, reforestation, remove of impervious surface, decommission forest roads.

Second Priority
None listed

Third Priority
1. Riparian enhancement.
2. Address water quality impacts – i.e., addressing illicit discharges, improve bio-filtration of runoff from major highways in the Lower South Fork Snoqualmie sub-basin.

Fourth Priority
1. Remove human-made instream barriers – i.e., culvert replacement.
2. Restore shoreline conditions – i.e., reduction in rip-rap along the channel edge.

Fifth Priority
1. Instream structural enhancement.

Capital Project Guidance from the Near Term Action Agenda

The following is relevant guidance in the *Near Term Action Agenda* that sponsors should use until the conservation plan is completed.

- Project sponsors should provide information about and seek input on proposed acquisition and restoration projects from residents, business interests, community groups, and landowners. Opportunities for public input should be provided throughout project selection, design, and implementation to help gain knowledge about local conditions and concerns.

- Restoration projects, especially dike and levee removal and installation of large woody debris projects, should be scoped and designed using both standard engineering practices and ecological expertise. Methods, effectiveness, and the evaluation of impacts should be monitored and used to inform future decisions about these types of projects.

- All projects will be conducted on a **voluntary basis with willing landowners**. Complex restoration projects such as installation of large woody debris or other materials that may provide structural diversity and dike and levee setback or removal require sponsors to obtain funding, create conceptual designs, and develop engineered specifications. These types of projects must comply with local flood hazard regulations, Shoreline Management Act, State Environmental Policy Act, Clean Water Act and the Federal Endangered Species Act. Hazard considerations that are examined include potential impacts to: neighboring landowners, downstream banks and landowners, businesses, farmland, infrastructure including utilities, and, for large woody debris projects, boater safety. Design work for these projects should integrate engineering and ecological practices and expertise. Designs are reviewed by permitting agencies and peer engineers, and often by other agencies and organizations such as the Department of Transportation and utility companies. There are opportunities for public input during the design and permitting phase.

  Placement of large woody debris is not a high priority in the interim strategy. However, all projects involving placement of large woody debris or other materials that may provide structural diversity or engineered log jams, require analysis and modeling for scour, hydrologic and sediment regiment, flow as related flood stage, buoyancy and rotational aspects of the wood, and the impact that projects can withstand, and long-term maintenance. This is to ensure that the projects can withstand flood flows and do not cause siltation. Based on these analyses, anchoring of wood may be required. All large woody debris projects require permits. Large woody debris installation projects should be undertaken in consultation with other jurisdictions in the Snohomish River basin because of the potential to alter stream courses.

IV. PROJECT REVIEW CRITERIA AND EVALUATION PROCESS

Criteria: Benefit to Salmon

Category	High Benefit Project Definition (Score=5)
Watershed Processes and Habitat Features	Addresses high priority habitat features and/or watershed process that significantly protects or limits the salmonid productivity in the area. • *Protects and/or restores habitat or natural ecosystem processes rather than replaces a missing structural element* • *Addresses causes, not symptoms* • *Has a broad geographic effect rather than a specific site* <u>Acquisition:</u> More than 60% of the total project area is intact habitat, or if less than 60% project must be a combination that includes restoration. • *Project protects intact habitat processes and high quality habitat, especially where they are threatened by imminent harm* <u>Assessment:</u> Crucial to understanding watershed processes, is directly relevant to project development or sequencing, and will clearly lead to new projects in high priority areas.
Areas and Actions	Is a high priority action located in a high priority geographic area. • *Follows the Snohomish River Basin Interim Salmon Habitat Protection and Restoration Strategy* • *Targets projects in the Nearshore, Estuary, Mainstem-primary restoration, and Headwaters-primary protection sub-basin strategy groups.* • *Focused on rearing habitat* <u>Assessment:</u> Fills an important data gap in a high priority area.
Scientific	Is identified through a documented habitat assessment.
Species	Addresses multiple species or unique populations of salmonids essential for recovery or ESA-listed fish species or non-listed populations primarily supported by natural spawning. Fish use has been documented.
Life History	Addresses an important life history stage or habitat type that limits the productivity of the salmonid species in the area and/or project addresses multiple life history requirements.
Costs	Has a low cost relative to the predicted benefits for that project type in that location.

Category	Medium Benefit Project Definition (Score=3)
Watershed Processes and Habitat Features	May not address the most important limiting factor, but will improve habitat conditions. • *Protects and/or restores habitat or natural ecosystem processes rather than replaces a missing structural element* • *May address causes, not symptoms* • *May have a broad geographic effect rather than a specific site* <u>Acquisition:</u> 40-60% of the total project area is intact habitat, or if less than 40-60% project must be a combination that includes restoration. • *Project protects mostly intact habitat processes and moderate quality habitat, especially where they are threatened by imminent harm* <u>Assessment:</u> Will lead to new projects in moderate priority areas and is independent of other key conditions being addressed first.
Areas and Actions	May be an important action, but located in a moderate priority geographic area. • *Follows the Snohomish River Basin Interim Salmon Habitat Protection and Restoration Strategy* • *Targets projects in Mainstem-secondary restoration, Rural Streams-primary restoration, and Headwaters-secondary restoration sub-basin strategy groups* • *Focused on rearing or spawning habitat* <u>Assessment:</u> Fills an important data gap, but is in a moderate priority area.
Scientific	Is identified through a documented habitat assessment or scientific opinion.
Species	Addresses a moderate number of species or unique populations of salmonids essential for recovery or ESA-listed fish species or non-listed populations primarily supported by natural spawning. Fish use has been documented.
Life History	Addresses fewer life history stages or habitat types that limits the productivity of the salmonid species in the area and/or partially addresses fewer life history requirements.
Costs	Has a reasonable cost relative to the predicted benefits for that project type in that location.

Category	Low Benefit Project Definition (Score=1)
Watershed Processes and Habitat Features	Has not been proven to address an important habitat condition in that area. • *May replace a missing structural element rather than protects or restores habitat or natural ecosystem processes* • *May not address causes* • *May not have a broad geographic effect*
Areas and Actions	Addresses a lower priority action or geographic area. • *Follows the Snohomish River Basin Interim Salmon Habitat Protection and Restoration Strategy* • *Targets projects in Rural Streams-secondary restoration, Urban Streams-restoration, Headwaters-secondary protection, Headwaters-above natural barriers, and Headwaters-restoration above falls and dams sub-basin strategy groups* • *Not focused on rearing habitat*
Scientific	Is unclear or lacks scientific information about the problem being addressed.
Species	Addresses a single species of lower priority. Fish use may not have been documented.
Life History	Is unclear about the salmonid life history being addressed.
Costs	Has a high cost relative to the predicted benefits for that project type in that location.

Criteria: Certainty of Success

Category	High Certainty Project Definition (Score=5)
Appropriate	Scope is appropriate to meet its goals and objectives. • *Scope of work is complete* • *Makes use of low-cost or in-kind resources*
Approach	Is consistent with proven scientific methods. • *Scope, methods, and materials are appropriate in scale and complexity to efficiently accomplish the work* • *Other approaches and opportunities were considered* <u>Assessment:</u> Methodology will effectively address an information/data gap or lead to effective implementation of prioritized projects within one-to-two years of completion.
Sequence	Is in the correct sequence and is independent of other actions being taken first.
Threat	Addresses a high potential threat to salmonid habitat.
Stewardship	Clearly describes and funds stewardship of the area or facility for more than 10 years. • *Self-sustaining or requires low maintenance* • *Monitoring plan or plan outline is related to project objectives* • *Funding for monitoring and maintenance is identified*
Landowner	Landowners are willing to have work done.
Community Support	• *Increases coordination, integrates efforts, and leverages resources* • *Sponsor works with appropriate partners for type of project* • *Project partners are identified* • *Builds on previous work* • *Leverages funding sources and/or partnerships*
Implementation	Actions are scheduled, funded, and ready to take place and have few or no known constraints to successful implementation as well as other projects that may result from this project. • *Sponsor is qualified to do the work*

Category	Medium Certainty Project Definition (Score=3)
Appropriate	Is moderately appropriate to meet its goals and objectives. • *Scope of work is mostly complete* • *Makes some use of low-cost or in-kind resources*
Approach	Uses scientific methods that may have been tested but the results are incomplete. • *Scope, methods, and materials may be appropriate in scale and complexity to efficiently accomplish the work* • *Other approaches and opportunities may have been considered* <u>Assessment:</u> Methods will effectively address an information/data gap or lead to effective implementation of prioritized projects within three-to-five years of completion.
Sequence	Is dependent on other actions being taken first that are outside the scope of this project.
Threat	Addresses a moderate potential threat to salmonid habitat.
Stewardship	Clearly describes but does not fund stewardship of the area or facility for more than 10 years. • *Project may not be self sustaining or requires moderate maintenance* • *Funding for monitoring and maintenance may be identified*
Landowner	Landowners may have been contacted and are likely to allow work to be done.
Community Support	• *Has some coordination, integrates efforts, and leverages some resources* • *Sponsor works with appropriate partners for type of project* • *Project partners may be identified* • *May build on previous work* • *Leverages some funding sources and/or partnerships*
Implementation	Has few or no known constraints to successful implementation as well as other projects that may result from this project. • *Sponsor is qualified to do the work*

Category	Low Certainty Project Definition (Score=1)
Appropriate	It is unclear how the goals and objectives will be met. • *Scope of work is incomplete* • *Does not make use of low-cost or in-kind resources*
Approach	Uses methods that have not been tested or proven to be effective in past uses. • *Scope, methods, and materials may not be appropriate* • *Other approaches and opportunities were not considered*
Sequence	May be in the wrong sequence with other protection and restoration actions.
Threat	Addresses a low potential for a threat to salmonid habitat.
Stewardship	Does not describe or fund stewardship of the area or facility.
Landowner	Landowner willingness is unknown.
Community Support	• *Limited coordination, integration of efforts, and leveraging of resources* • *Project partners not identified* • *Leverages limited funding sources and/or partnerships*
Implementation	Actions are unscheduled, unfunded, and not ready to take place and have several constraints to successful implementation.

The Project Sub-committee will score each category based on the definitions explained in the previous section. For consistency, a score of 5 will be high, 3 will be medium and 1 will be low. All categories were given a multiplier based on their relative importance. Benefit and certainty will not be combined, so each project will have two overall scores.

Benefit to Salmon Categories	Category Scoring (0-5)	Multiplier	Total Possible Points (100)
Watershed Process and Habitat Features	5= high 4 3= medium 2 1= low 0	7	35
Areas and Actions		5	25
Scientific		2	10
Species		2	10
Life History		2	10
Costs		2	10

Certainty of Success Categories	Category Scoring (0-5)	Multiplier	Total Possible Points (100)
Appropriate	5= high 4 3= medium 2 1= low 0	3	15
Approach		3	15
Sequence		3	15
Threat		3	15
Stewardship		2	10
Landowner		4	20
Community Support		1	5
Implementation		1	5

APPENDIX A: DRAFT DECISION MAKING CRITERIA

Decision-making Goal	Decision-making Objective (trade-able criteria)	Measure
Plan Design		
A. Support restoration of healthy and harvestable populations of wild salmonids	Minimize risk of Chinook extinction	Probability estimate (% in 100 years) (roll up of the VSP parameters)
	Increase Chinook abundance	Recruitment (numbers of returning adults pre-harvest)
	Increase Chinook productivity	Index: Number of surviving juveniles and returns per spawner
	Improve life history diversity for spawners	Number of life history strategies
	Maintain spatial structure	Index: How many subbasins are used by juveniles and adults
	Minimize risk of bull trout extinction	Level of effort in nearshore and headwaters areas
	Increase abundance, productivity, diversity and spatial structure of other salmonid stocks	Level of effort to protect and restore tributaries
B. Improve ecosystem processes	Improve water quality	Actions in areas with WQ problems as documented in the Habitat Conditions Review
	Maintain current flow regime	Index: Change in amount of impervious areas and hydrologically mature forest land
	Improve ecosystem resiliency	*????*
	Minimize adverse impacts to other wildlife populations	*Idea: Status of key indicator species.*

Decision-making Goal	Decision-making Objective (trade-able criteria)	Measure
C. Support local communities	Avoid adverse impacts to agricultural viability	Acres of agricultural land affected
	Protect health and safety (protect property from flooding)	Number of actions that occur in areas with repetitive losses (will the actions increase or decrease the existing risk?)
	Enhance conservation ethic	Number of people engaged in plan activities
	Minimize any decrease in recreational opportunities	Change in number of access points
	Minimize adverse impacts to human water supply	Changes in water available for existing/future rights
	Improve tribal access for ceremonial and subsistence harvest	Index that includes number of days and locations
D. Support basin-wide economic viability	Restore tribal commercial harvests	*Idea: $ net present value of expected harvests ??*
	Restore non-treaty commercial harvests	*Idea: $ net present value of expected harvests ??*
	Restore recreational harvests	Number of angler days
	Minimize additional cost from new regulations	Cost to implementing agency and regulated community
	Maximize habitat-related benefits to property values	Number of parcels adjacent to and/or in proximity of a forested natural area or open space

Decision-making Goal	Decision-making Objective (trade-able criteria)	Measure
Plan Process		
E. Facilitate plan acceptance and support	Maximize overall plan efficiency	Total $ costs relative to total benefits. Incremental $ costs relative to incremental benefits between alternatives
	Share costs (benefits?) fairly among participants	*Idea: (distribution of cost/land area or distribution of costs/tax base or distribution of costs/population)*
	Minimize risk of legal uncertainty under ESA	Index: Likelihood of winning a legal challenge for Chinook/bull trout plus coho
	Promote innovative solutions	*Index: quantity and quality*
	Respect property rights	Index: condemnation, loss of property use, and use of incentives and voluntary approaches
	Promote plan endorsement by local jurisdictions	*Idea: Local resident support and jurisdiction support*
	Reduce key science gaps	Index: $ for research and adaptive mgt trials and mechanism for planning and coordination
F. Facilitate plan implementation	Maximize available funding	% est. total costs available
	Reduce time required for implementation	# years to reach the Shared Strategy planning targets and ranges
	Encourage implementation of salmon recovery measures into ongoing GMA, SMA process	Scale: compatibility and integration or degree of implementation
	Promote flexibility in timing of actions (of implementation?)	Scale: Degree of timing flexibility H, M, L
	Certainty that actions will be implemented	Likelihood that jurisdictions are willing to commit to implementation

Key concepts to apply to all plan alternatives:
1. Contribute to Endangered Species Act (ESA) delisting of Chinook and bull trout
2. Incorporate local knowledge
3. Promote opportunities for collaboration among interests, jurisdictions, citizens and others interested in salmon recovery
4. Encourage community input to planning and implementation process
5. Promote use of adaptive management by agencies and landowners??
6. Encourage plan actions that complement (vs. duplicate) existing plans and programs (business certainty??)
7. Maintain a local-based, pro-active approach to salmon recovery
8. Support retention of salmon as a local icon
9. Respect Tribal rights and support Tribal cultural uses of salmon
10. Strengthen and enforce existing regulations before proposing new ones
11. Plan recommendations will be integrated in the GMA. This includes a) technical documentation for salmon recovery that can be used as a reference document GMA's Best Available Science requirements, b) information flows from each process to the other, c) recommendations from the salmon recovery planning that can be used for land use plans, priorities for capital projects, updates for regulations and enforcement programs, and d) development of salmon recovery alternatives and negotiation of acceptable alternatives.

APPENDIX B: OVERVIEW OF ECOLOGICAL ANALYSIS

Introduction

The *Ecological Analysis for Salmonid Conservation*[2] (Ecological Analysis) was developed by the Snohomish River Basin Salmonid Recovery Technical Committee (Technical Committee) The Ecological Analysis is the technical foundation for the Forum's Conservation Plan. The objectives of the Ecological Analysis are to:

- Integrate existing and ongoing inventories and analyses into one framework;
- Update the Chinook salmon conservation strategy articulated in the Near Term Action Agenda to incorporate new data, broaden to include other salmonid species, and provide long-term, basin-wide guidance. The Ecological Analysis identifies Chinook, bull trout, and coho as proxy species to represent all salmonids in the basin. Given their unique habitat requirements and broad distribution, it is assumed that a plan that addresses the needs of these species will provide multi-species protection.
- Develop and test recovery strategies to assist the Forum in crafting conservation alternatives and in selecting a preferred alternative for the Conservation Plan.

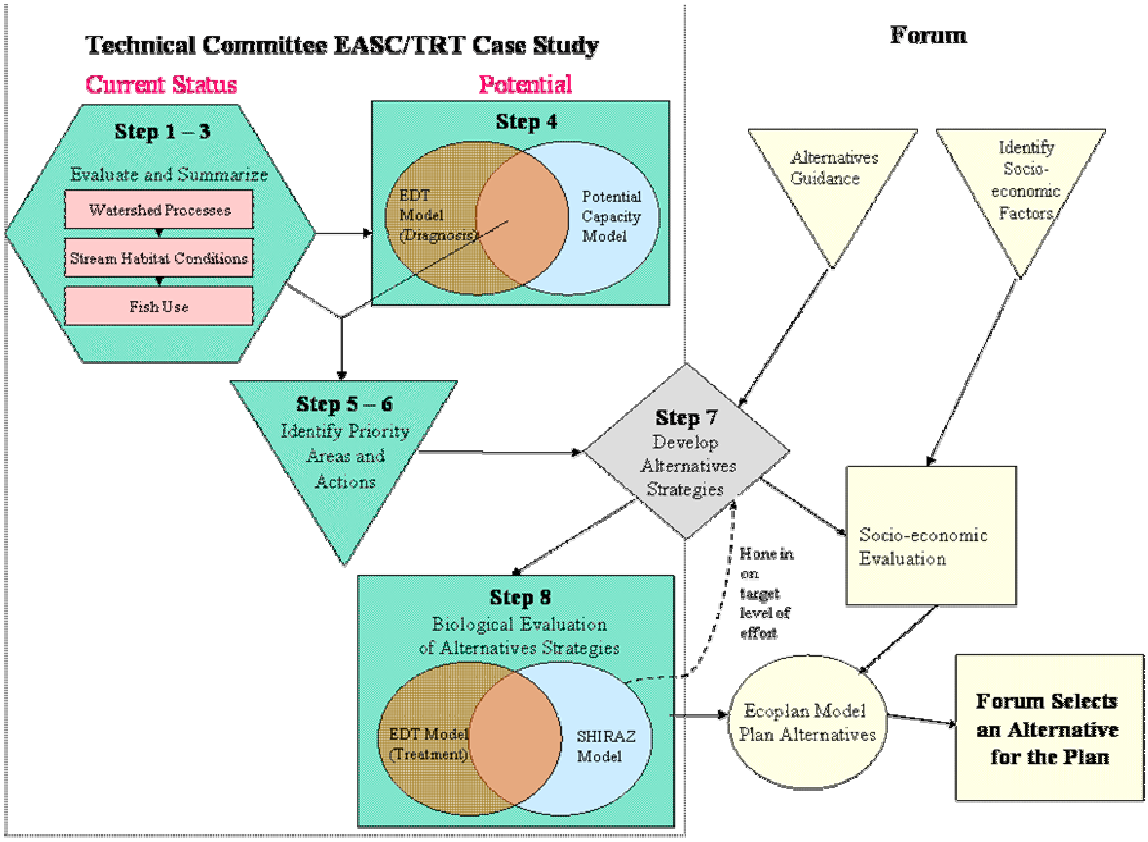
The Ecological Analysis is a collaborative effort between the Technical Committee and the NOAA Fisheries Puget Sound Technical Recovery Team (TRT). The Snohomish River basin was selected as case study by the TRT to test how well the principles and general guidance in its "Watershed Guidance" document will work in an actual watershed with an established watershed group.[3] Through this partnership, NOAA Fisheries contributed additional resources to the Ecological Analysis.

Eight Steps of the Ecological Analysis

The Ecological Analysis has eight steps. The building blocks of a strategy are compiled in Steps 1 through 4 and then integrated to identify focus areas and recovery actions from an ecological perspective in Steps 5 and 6. Data were compiled for each step and summarized in tables and presented in maps. The tables provide the basis for updating the Near Term Action Agenda "focus areas" to include multiple species of salmon, to incorporate new information, and to identify the data underlying designation of specific geographic areas as high, moderate, low, or potential use.

[2] This section is a summary. Complete details can be found in the *Ecological Analysis for Salmonid Conservation,* Snohomish Basin Salmonid Recovery Technical Committee, in prep.
[3] The TRT and NOAA Fisheries refer to the Ecological Analysis as the "Case Study".

Figure 1. Eight Steps of the Ecological Analysis



Step 1: Step 1 is a summary of the relative current fish use in the basin for Chinook, bull trout, and coho to determine where spawning and rearing are concentrated in the basin. The Skykomish and Snoqualmie populations described by the Puget Sound Technical Recovery Team (Ruckelshaus et al. 2003) represent the historic population structure of Chinook salmon in the Snohomish River basin. Data sources include spawner surveys and juvenile sampling data.

Step 2: Step 2 is an evaluation of stream habitat conditions across the basin based on available data. Current stream habitat conditions provide guidance on which habitat elements require conservation actions. Information on stream habitat conditions also provides a baseline for evaluating improvement or degradation over time. In this analysis, the results of the Habitat Conditions Review (HCR) and the Limiting Factors Analysis (LFA) are integrated into one table. The level of certainty associated with each conclusion regarding habitat condition is included.

Step 3: Step 3 is an analysis of the underlying watershed processes that drive habitat conditions and influence population performance. This analysis was performed by NOAA Fisheries and follows a template similar to the approach used in research performed in the Skagit watershed. Step 3 is necessary to help develop recovery actions

that address the root causes of population decline rather than just the symptoms. In many cases, the most important projects and long-term fixes will be located upstream of areas of high fish use and where indicators of habitat problems are evident.

Step 4: The analysis in Step 4 summarizes the difference between current and historical potential for fish use and makes the link between habitat and population performance. It sets the context for where restoration could occur and what is possible. Both Ecosystem Diagnosis and Treatment (EDT) developed by Mobrand Biometrics, Inc. and the Potential Capacity models developed by NOAA Fisheries are used to make this link. Comparing results from both models will provide greater confidence in the outcome.

Step 5: Step 5 synthesizes data from Steps 1 and 4 to identify the geographic areas that are most critical for protection and restoration for the three proxy species. High priority areas have high current use (Step 1) and/or high potential (Step 4). This step identifies the areas of focus that will give the greatest return in terms of protecting and improving population performance.

Step 6: Step 6 integrates the results of all previous analyses to organize subbasins into strategy groups, generate hypotheses, and identify and rank actions within subbasins and among subbasin strategy groups to address the main factors limiting recovery. The analysis is conducted on a subbasin scale because restoration actions are targeted primarily at watershed processes, and on a subbasin strategy group scale (defined below) to bring hypothesis generation and strategy development down to a manageable level. Also with a focus on simplification, actions to address the main factors limiting recovery are organized in broad action classes. Different types of projects and various policy choices (e.g., regulatory or capital) for addressing them are possible within each action class.

The generation of hypotheses is a central component of Step 6. Hypotheses help to guide the development of an overall strategy for recovering salmon (Puget Sound TRT, 2003). Hypothesis development can occur at multiple scales: in this exercise, two scales are used – the basin scale and the sub-basin strategy group scale. On the basin scale, general hypothesis narratives are provided for population structure and the potential effects of habitat, harvest and hatchery management on salmon population status.

Following hypothesis generation, on-the-ground actions to improve habitat conditions and, in turn, the viability of salmonid populations are proposed and ranked within individual subbasins (Step 6-1 Table) and among subbasin strategy groups (Step 6-2 Table). Potentially appropriate actions within individual subbasins, simplified as general action classes, are identified based primarily on instream habitat conditions (Step 2) and watershed process conditions (Step 3), although additional criteria are used to identify appropriate locations for off-channel habitat reconnection and marine-derived nutrient enhancement projects. An action's rank indicates its potential "bang" in terms of VSP. Ultimate priorities will be decided upon after looking at the rank along with other factors such as logistics, constraints, and other political and socioeconomic considerations.

While there is substantial overlap in habitat utilization by coho salmon with ESA listed salmonids, coho salmon spawning and rearing occurs more broadly and in smaller streams. To encourage adequate protection of habitat used by coho salmon, high and moderate use coho subbasins are identified, and additional prescriptions along small streams are recommended in these areas.

The hypotheses are used to guide strategy development in Step 7, and the effects of actions suggested by strategies are estimated in Step 8 using the EDT and SHIRAZ models. Hypotheses underlying the habitat strategies needed for the recovery of the salmon populations in the Snohomish River basin will be tested and refined with empirical information on salmon population response gained from a good monitoring and evaluation plan (Puget Sound TRT 2003).

Step 7: The Forum provided guidance to develop fish-based recovery strategies that will reach a range of targets over a range of time frames. The Shared Strategy planning target range for Chinook will be used as guidance. In Step 7, the Technical Committee will work with the Policy Development Committee to develop the Forum's fish-based strategies based on the analyses in Steps 1 through 6. Alternative fish-based strategies will be composed of quantities of actions and habitat within and aimed at priority areas. The SHIRAZ model will be used to hone in on types of actions and levels of effort that will meet the population targets over specific time frames. The methods and cost estimates for achieving the habitat quantities will be identified as part of a socio-economic analysis being conducted by the Policy Development Committee at the request of the Forum.

Step 8: In Step 8, the final fish-based recovery strategies will be evaluated using both the EDT and SHIRAZ models. Results will be presented in terms of population performance parameters: abundance, productivity, diversity and spatial structure.

The Forum will then use a set of criteria to evaluate the alternative fish-based recovery strategies and select an alternative for the plan.

Hypotheses

These hypotheses are based on the analysis of available data and are designed to guide development of a strategy to recover salmon in the Snohomish River basin. On the basin scale, hypotheses have been developed for population structure and the potential effects of habitat, harvest and hatchery management on salmon population status. For the 12 sub-basin strategy groups, habitat-based hypotheses have also been developed. These hypotheses will be tested through a solid monitoring and evaluation plan, and actions across the "Hs" (i.e., habitat, hatchery and harvest management) may need to be adjusted as model predictions are refined and salmon population responses are observed over time (Puget Sound TRT 2003).

Basin Scale Hypotheses

At the basin scale, general hypotheses have been developed for population structure and the potential effects of habitat, harvest and hatchery management on salmon population status.

Population structure. The Skykomish and Snoqualmie populations described by the Puget Sound Technical Recovery Team (Ruckelshaus et al. 2003) represent the historic population structure of Chinook salmon in the Snohomish basin. The Skykomish population includes all chinook that spawn in the Skykomish River and its tributaries and in the Snohomish River and its tributaries, including the Pilchuck River. The Snoqualmie population includes all the chinook that spawn in the Snoqualmie River and its tributaries.

WDFW (1998) identifies a single bull trout/dolly varden stock in the Snohomish River basin. Spawning areas in the upper North Fork Skykomish and tributaries between Bear Creek falls and Deer Creek falls, as well as in the East Fork Foss River. SASSI identifies four coho stocks in the Snohomish River basin based on geographic distribution: Snohomish coho, Skykomish coho, South Fork Skykomish coho, and Snoqualmie coho. It is hypothesized that the current and historic population structures are the same.

Salmonid Habitat. The quantity and quality of aquatic habitat and the watershed process conditions that create and sustain high quality habitat have been substantially altered across the Snohomish River basin. This has occurred over a period of many decades, through many public and private actions that have changed land use/land cover across the landscape and altered the character and condition of stream corridors and floodplains. While habitat quantity and quality affect capacity and survival throughout the salmonid life cycle, the loss of rearing habitat quantity and quality along mainstems and within the estuary and nearshore environment is thought to be the primary factor affecting population performance for Snohomish Basin Chinook salmon. Actions that improve floodplain connectivity and habitat complexity in the vicinity of and downstream from Chinook spawning areas are predicted to have the highest effectiveness in terms of population performance.

Actions in these areas alone, however, will not lead to recovery of all components of viable populations for all salmonids. For example, spatial structure and diversity targets for Chinook salmon will not likely be met without significant additional protective and restorative efforts to enhance spawning conditions and egg-to-fry survival within large tributary sub-basins. Furthermore, healthy and harvestable coho salmon populations are unlikely over the long-term without measures to maintain adequate flows, sediment conditions, LWD loading, nutrient levels and temperatures in lowland tributaries where coho spawn and rear and in headwater sub-basins with habitat process contributions to areas downstream. Likewise, the viability of bull trout in the Snohomish Basin depends on preservation of watershed processes and habitat conditions in the limited spawning areas in the Upper North Fork Skykomish and Foss River sub-basins.

An ecosystem approach to salmonid recovery is critical. Watershed processes initiated throughout the river basin strongly influence habitat capacity and conditions downstream. Furthermore, multiple habitat factors may be at work in limiting the population or may shift in relative importance as conditions vary over time. For example, rearing habitat in the estuary and lower mainstem may be seeded to capacity, thereby limiting population size. In future years, however, an increase in rearing capacity through restoration or a decrease in the number of outmigrants due to low survival to emergence caused by extensive scouring of redds may shift the bottleneck upstream.

For these reasons the most successful, lowest risk strategy for salmonid recovery in the Snohomish River basin will include restoration and preservation actions focused on watershed processes across the basin, with special emphasis on rearing habitat improvements in the mainstems, estuary and nearshore environment. All sub-basins have a role to play in a basinwide strategy.

Chinook Harvest. Exploitation rates on the Skykomish and Snoqualmie Chinook populations have declined from nearly 80% in the late 1970s to 20-25% today. It is likely that the higher end of this range exceeded the harvestable surplus production from these populations, at least during periods of low and moderate marine survival, thus contributing to the observed declines in spawning escapement numbers. Based on recent analyses of spawner-recruit data, annual exploitation rates below 24% will allow these populations to increase in abundance towards the recovery goals if other factors, such as freshwater and estuary habitat quality and quantity and ocean survival rates improve. In addition, there may have been other impacts, such as reduced fish size, average age, and fecundity associated with past high exploitation rates. Maintaining annual exploitation rates below 24% will result in increased average age at spawning, increased average size, and increased average fecundity.

Chinook Hatcheries. Artificial propagation programs operated in Snohomish Basin freshwater and nearshore-marine areas to produce fish for fisheries harvest augmentation purposes[4] may have resulted in adverse ecological, genetic, and demographic impacts that affected the viability of native, natural-origin fish populations. Activities associated with hatchery programs, including physical operation, broodstock collection, juvenile fish rearing and release, and resultant adult fish production, may harm wild fish populations through: migration delay or blockage; incidental removal of returning adults; amplification and transmittal of fish disease pathogens; food resource competition; predation; decreased genetic diversity and fitness through hatchery adult straying and interbreeding with wild fish in natural spawning areas; and, exacerbation of harvest-related effects. Of these potential hazards to wild fish population viability, those that may be specifically applicable to Snohomish Basin hatchery programs have included: production of non-native Chinook salmon that posed genetic introgression risks to native Chinook salmon populations, potentially affecting their diversity and productivity; predation by newly released hatchery-origin steelhead and coho salmon yearlings on

[4] Four main hatchery facilities in the Basin area – Wallace River, Bernie Kai-Kai Gobin, Reiter Pond, and Tokul Creek - have collectively released ~13.4 million juvenile salmonids each year, of which 3.6 million were Chinook, 1.35 million were coho, 8.0 million were chum, and 0.452 million were steelhead.

rearing or emigrating wild juvenile Chinook salmon, leading to decreases in wild population abundance; delay or blockage of migrating adult Chinook salmon through hatchery weir operations in the Wallace River and on Tokul Creek, potentially affecting population spatial structure, productivity and abundance; incidental removal of wild Chinook salmon collected at the Wallace River Hatchery weir for use as hatchery broodstock, decreasing population abundance; and, overharvest of wild Chinook salmon in marine and freshwater area fisheries directed at returning Snohomish Basin hatchery-origin adult fish, also decreasing population abundance.

Hatchery and harvest reform measures implemented by the fish resource managers have minimized the risk of adverse effects for most of these basin-specific hazards. Non-native Chinook salmon propagated as a primary harvest augmentation stock have been replaced with Skykomish-origin stock, substantially decreasing the risk of among population diversity reduction and fitness effects on native Chinook salmon populations. Salmon migration delay and blockage effects at hatchery weirs have been addressed through weir reconfiguration and implementation of trapping protocols providing for timely upstream passage of wild adult salmon needed to adequately seed upstream areas. Removal effects on wild Chinook salmon have been minimized through mass marking of hatchery-origin Chinook salmon, allowing either visual identification and release of unmarked, wild fish or time-area management that can be documented to target hatchery fish with minimal impact on wild fish. Harvest levels on Snohomish wild Chinook in fisheries directed at hatchery fish are maintained, through catch monitoring programs, within conservative overall exploitation rate guidelines applied under the harvest management plan. These harvest guidelines are expected to lead to increased wild salmon population viability. Potential predation risks to wild juvenile fish posed by hatchery-origin yearlings, especially by relatively large steelhead yearlings released in April, have not as yet been addressed through reform measures. Studies are needed to identify predation levels associated with the yearling salmon production programs, and management responses that may be necessary to minimize effects on wild salmon population abundances.

Step 6 Details

Sub-basin Strategy Groups

Sub-basin strategy groups are based on three variables: geo-spatial class, fish use and potential use, and watershed process condition as defined below.

Geo-spatial Class. The following is a coarse scale sub-basin grouping based on landform and location. Sub-basins within geo-spatial classes play a similar role in supporting salmon life histories and have similar geomorphic features.

- Nearshore — shoreline from Mukilteo to Kayak Point including Puget Sound out to 30 m depth below mean lower low water (MLLW) and upland areas within 200 feet of ordinary high water (OHW) or to the top of coastal bluffs, whichever is greater.

- Estuary — Fresh/salt water mixing zone where the Snohomish River enters Puget Sound. For the conservation plan, it is delineated at the upstream end where Ebey Slough breaks off from the mainstem and at the downstream at an imaginary line stretching between Priest Point and the north tip of Jetty Island.
- Mainstems — Sub-basins that contain large rivers and the lower portion of major tributaries with floodplains. For the conservation plan, any sub-basin with other sub-basins flowing into it is considered a mainstem sub-basin.
- Lowland Tributaries — Tributary streams with a mean elevation of less than 1000 meters.
- Headwaters — Tributary streams with a mean elevation greater than or equal to 1000 meters.

Fish Use and Potential Class. These are based on the highest rating for Chinook use, Chinook potential or bull trout use (listed as class A, B, C or D in Table 2).

- High — contains a reach or reaches with high use (>12% total escapement by population, Class A), high potential or both.
- Moderate — contains a reach or reaches with moderate use (8-12% escapement by population, Class B), moderate potential or both.
- Low — contains a reach or reaches with low use (<8% escapement by population, Class C), low potential or both.
- Resident Population Only — located outside the historical or current range of the anadromous fishes (Class D).

Watershed Process Condition Class. This is based on the combined scores of the hydrology, riparian, and sediment analyses in the Ecological Analysis.[5]

- Intact — All watershed processes assessed are "intact" within the sub-basin.
- Moderately Degraded — Hydrology, riparian, and/or sediment processes are "moderately degraded." All three are neither "intact" nor "degraded."
- Degraded — All watershed processes assessed are "degraded" within the sub-basin.

Focus Reaches. Many of the sub-basins have focus reaches and the actions described below may be targeted at specific reaches.

[5] A sub-basin is classified as "intact" for hydrology or riparian conditions if 80% or more of the sub-basin is "intact" based on the watershed process modeling. A sub-basin is classified as "moderately degraded" for hydrology or riparian conditions if at least 50% but less than 80% of the sub-basin is "intact." A sub-basin is classified as "degraded" for hydrology or riparian conditions if less than 50% of the sub-basin is "intact." The sediment process analysis was only applied in sub-basins with a mean elevation greater than or equal to 1,000 meters. Sub-basins with less than or equal to 1.5 times the modeled natural rate of sediment production were classified as "intact." Sub-basins with greater than 1.5 times the modeled natural rate of sediment production were classified as "degraded."

- Primary Focus Reaches – These reaches were identified in the NTAA as Chinook "focus areas" that fall within high use and/or high potential use sub-basins identified through the EASC analysis. If a "focus area" was not identified within the sub-basin in the NTAA, then all the EDT reaches within the sub-basin are identified as focus reaches. Key spawning reaches for bull trout in the Upper North Fork Skykomish and Foss River sub-basins that were identified by WDFW are also included as primary focus reaches.

- Secondary Focus Reaches – These are Chinook reaches that were identified for the EDT analysis that was commissioned by the Tulalip Tribes. While these reaches encompass the vast majority of Chinook spawning and rearing, it should be noted that Chinook occur on a limited basis outside this range. Thus, the absence of an EDT reach should not be interpreted as meaning that Chinook are not present within other reaches or sub-basins. Maps produced by the Washington State Conservation Commission as part of the WRIA 7 Limiting Factors Analysis report (2002) provide a more comprehensive representation of known Chinook distribution.

Recommended Actions

Eleven action classes are identified as a means for organizing and simplifying strategy development. Potentially appropriate actions within individual sub-basins, simplified as general action classes, are identified based primarily on instream habitat conditions and watershed process conditions, although additional criteria are used to identify appropriate locations for off-channel habitat reconnection and marine-derived nutrient enhancement projects. An action's rank indicates its potential "bang" in terms of Viable Salmonid Population (VSP) analysis. Additional prescriptions along small streams are recommended in areas where coho salmon spawn and rear. It is important to note that Table A-1 is on a coarser scale than Table A-2.

Recommended Actions and Rank among Sub-basin Strategy Groups

In Table A-1, recommended actions are identified and ranked among sub-basin strategy groups based on geo-spatial characteristics, current and potential level of use by Chinook and bull trout, and the condition of watershed processes.

1) Actions were identified as recommended or not recommended. If a specific action was not recommended based on available data, the cell in the table was shaded. This includes situations where actions were not necessary because conditions were intact, inconsistent with the geo-spatial characteristics, or unlikely to be successful given the existing level of development.
2) Unshaded boxes then received a score of 1 through 5 (more important to less important) based on the three classes comprising watershed strategy groups. A high ranked action in Table A-1 means that addressing a specific habitat problem is a priority where it exists within the sub-basin group. While in most cases the identified

habitat problem will occur in all sub-basins within the strategy group, this may not always be the case.

3) Bolded cells in the table identify habitat actions that will address habitat attributes identified through the Tulalip Commissioned EDT analysis as having a high or extreme effect on population performance within the sub-basin.

4) Coho production in the Snohomish River basin is high relative to that in other Puget Sound basins and coho are broadly distributed throughout the Snohomish system. The actions listed will benefit coho, although coho-specific actions are not called out in the tables. Additional actions along small streams in sub-basins with high and moderate coho use are recommended to improve access to habitat and the quality of those habitats. For basins with known, but less quantified coho use, similar actions may be appropriate.

Preservation (Proximate to Aquatic Habitat) – protects existing habitat quantity and quality in areas of high current use or potential. Actions protect areas of habitat complexity and riparian functions and provide room for channel movement.

- The recommended sequence is based on ratings for Chinook and bull trout use and potential class, and is rated 1 through 3 for high, moderate, and low use sub-basin strategy groups, respectively. Areas that are inaccessible to anadromous species are shaded in the table because they generally have fewer threats than areas in the lower basin. Their role in a basin-wide strategy is primarily to provide watershed process support and cool, clean water for areas of high current use or potential downstream.

Preservation (to Support Hydrologic and Sediment Processes) – protects watershed functions such as the delivery and routing of water and sediment that create and maintain habitat quantity and quality in areas of high current use or potential downstream. Actions protect large areas of hydrologically mature forest, floodplains, and wetlands.

- This is ranked first tier across the basin because protecting underlying watershed processes is critical for creating and maintaining high quality habitat downstream. The nearshore is shaded because there is no upland component that is not covered under the definition of proximate habitat. The estuary is shaded because protection of hydrologic and sediment processes is covered by "Reconnect off-channel habitats". The Urban Streams sub-basin strategy group is shaded because hydrologic processes have been substantially degraded, and opportunities to preserve watershed process function are limited. Restoration in urban streams will focus on the riparian and instream environments. Undoubtedly, some upstream basins will have a greater influence on downstream conditions, but the data are not currently available.

Remove Human-made Instream Barriers – increases rearing habitat capacity for chinook and bull trout by removing barriers on small streams within one-half mile of spawning reaches. Removing these barriers will also increase spawning habitat, as well as coho rearing habitat.

- The recommended sequence is based on ratings for Chinook and bull trout use and potential class, and is rated 1 through 4 for high, moderate, and low use, and resident

only sub-basin strategy groups, respectively. The estuary is shaded because barriers will be addressed through restoration of tidal marsh.

Reconnect Off-Channel Habitats – increases rearing habitat and in some cases spawning habitat by restoring accessibility to floodplain habitats such as side channels, sloughs and wetlands.

- This is recommended in the estuary, along mainstem reaches, and in large tributaries. Lowland tributaries are shaded because they generally lack substantial floodplain habitat. Headwater areas above natural barriers are shaded because most off-channel habitats remain connected, and reconnection of the few isolated off-channel habitats will have limited benefit in a multi-species, basin-wide strategy.

Restore Shoreline Conditions – increases the quantity and complexity of habitat in mainstems by modifying, setting back, and removing bank armoring.

- The recommended sequence is based on ratings for Chinook and bull trout use and potential class, and is rated 1 through 4 for high, moderate, and low use, and resident only sub-basin strategy groups, respectively.

Restore Hydrologic Processes – restores a more natural timing, frequency, and duration of peak flows and low (base) flows through reforestation, wetland restoration, floodplain reconnection, decommissioning of forest roads, and impervious surface reduction.

- This is recommended across the basin regardless of fish use because hydrologic processes are critical for creating and maintaining high quality habitat over the long-term. Without protection and restoration measures aimed at the hydrologic regime, other classes of restoration projects are unlikely to be effective. The Nearshore and Estuary are shaded for peak flow and base flow hydrology restoration because actions within these sub-basin groups will not impact downstream sub-basins in the same way. Other aspects of hydrology in these areas such as tidal exchange are addressed by other habitat actions. The Urban Streams sub-basin strategy group is shaded because hydrologic processes have been substantially degraded and opportunities to restore a natural hydrologic regime are limited. Several sub-basin strategy groups in the headwaters are shaded for hydrologic processes restoration because conditions re intact.

Control Sediment Processes – restores sediment process functions that deliver coarse and fine sediment to the aquatic system through reforestation, wetland restoration, floodplain reconnection, decommissioning of forest roads, and impervious surface reduction. Actions are particularly important where impacts are occurring on steep slopes and unstable landforms.

- This is recommended across the basin regardless of fish use because sediment processes are critical for creating and maintaining high quality habitat downstream over the long term. While this analysis is focused on stream habitat, alterations in the nearshore have reduced natural sediment delivery to beaches. The Urban Streams sub-basin strategy group is shaded because hydrologic processes have been

substantially degraded, and opportunities to restore a natural hydrologic regime are limited.

Riparian Enhancement – replants and enhances riparian forests to create a protective buffer between the channel and land use actions, and provide shade, cover, nutrient recruitment, LWD recruitment, and bank stability.

- The recommended sequence is based on ratings for Chinook and bull trout use and potential class, and is rated 1 through 4 for high, moderate, and low use, and resident only sub-basin strategy groups, respectively. Several sub-basin strategy groups in the headwaters are shaded for riparian process restoration because riparian processes are intact.

Address Water Quality Impacts – reduces water quality impacts through livestock fencing, farm plans, biofiltration of stormwater, shading., and stopping illicit discharges,

- The recommended sequence is based on ratings for Chinook and bull trout use and potential class, and is rated 1 through 4 for high, moderate, and low use, and resident only sub-basin strategy groups, respectively.

Nutrient Enhancement – provides an abundance of marine-derived nutrients from salmon carcasses to the freshwater ecosystem. Depressed runs have reduced this nutrient source. In areas of the watershed with low nutrient levels that once had large run sizes, salmon carcass placement provides a short-term nutrient boost to facilitate the rebuilding of run sizes.

- This is a recommended experiment as an interim solution in sub-basin strategy groups within the anadromous zone where there has been a high change in salmon abundance between historic to current conditions and water quality conditions are good. Only three sub-basin strategy groups located in the headwaters meet these criteria. In the other sub-basin strategy groups, there is potential that nutrient enhancement may exacerbate existing water quality problems. Nutrient enhancement is never ranked first tier because it is a temporary fix that addresses a symptom of declining salmon runs rather than a root cause.

Instream Structure Enhancement – Over time, restoration of watershed processes will restore channel complexity naturally, but in areas where there is a dearth of LWD and riparian forests are degraded, the installation of channel structures may be necessary to increase habitat quality in the near-term. Constructed logjams may also act to jump start natural channel migration and wood recruitment.

- This is recommended in sub-basin strategy groups with both “degraded” or “moderately degraded” channel conditions and degraded riparian conditions. The recommended sequence is based on ratings for Chinook and bull trout use and potential class, and is rated 2 through 5 for high, moderate, and low use, and resident only sub-basin strategy groups, respectively. Instream structure enhancement is never ranked first tier because it is not a sustainable solution over the long-term.

Recommended Actions and Rank within Individual Sub-basins (Table A-2)

Using the same action classes as in Table A-1, actions are also identified and ranked on a coarse scale within each sub-basin. The rank indicates the potential "benefit" relative to other actions in terms of population viability and is based on three principles:

1) Actions that are likely to improve conditions in high use and potential areas for Chinook salmon and bull trout char are ranked over actions that address other geographic areas and species;

2) Actions that are aimed at restoration of watershed processes or reconnection of isolated habitats are ranked over actions that are more temporary in nature; and

3) Preservation is always a top priority because protecting existing functions is cheaper, easier, and more likely to result in the desired long-term population response than restoring lost functions (refs).

The actions and their rankings are described below.

Preservation (Proximate to Aquatic Habitat)

- Rank 1 – The sub-basin contains one or more primary focus reaches. Preservation proximate to aquatic habitat for the purpose of protecting habitat quality, quantity, and complexity is recommend first along primary focus reaches, and second along other fish-bearing waters within the sub-basin.
- Rank 2 – The sub-basin does not contain a primary focus reach. Preservation proximate to aquatic habitat for the purpose of protecting habitat quality, quantity, and complexity is recommended along fish-bearing waters within the sub-basin.

Preservation (to Support Hydrologic and Sediment Processes)

- Rank 1 – Preservation actions that protect the controlling processes of hydrology and sediment are also ranked first tier in all sub-basins where these processes are "intact" or "moderately degraded" and along the mainstems. Preserving existing functions is easier than restoring lost functions. Watershed processes create and maintain the habitat conditions that sustain fish populations. Whether in the headwaters, lowland tributaries or along mainstems that provide primary rearing and spawning habitat for Chinook, preservation actions that protect the driving watershed processes such as hydrology, sediment, and riparian/LWD recruitment are critical actions.
- No Action (Shaded) – In urban lowland streams with "degraded" hydrologic and sediment processes, opportunities may no longer exist to protect these functions across the sub-basin.

Remove Human-made Instream Barriers

- Rank 1 – Habitat is "degraded" within the sub-basin and areas blocked are on or adjacent to a primary focus reach.

- Rank 2 – Habitat is "moderately degraded" within the sub-basin or access to habitat is "degraded" within the sub-basin, but areas blocked are not on or adjacent to a primary focus reach.
- No Action (Shaded) – Culverts have been surveyed and human-made barriers (if any) have been fixed.
- Action/Habitat Response – Protection protects watershed functions such as the delivery and routing of water and sediment that create and maintain habitat quantity and quality in core areas downstream.

Reconnect Off-Channel Habitats

- Rank 1 – contains one or more primary focus reaches and off-channel habitat areas that are known to be disconnected along primary focus reaches within the sub-basin (i.e., reconnection projects have been identified in the Habitat Conditions Review (HCR), Limiting Factors Analysis (LFA) or NTAA).
- Rank 2 – does not contain a primary focus reach, and off-channel habitat areas are known to be disconnected along anadromous fish-bearing waters within the sub-basin (i.e., reconnection projects have been identified in the HCR, LFA or NTAA).
- No Action (Shaded) – No major projects have been identified and are not likely to exist because the sub-basin is relatively pristine, or channels within the sub-basin are naturally entrenched and lacking floodplains. Areas that are not accessible to anadromous fish have been included in this category.
- Data gap (DG) – No projects have been identified or are likely to exist because the sub-basin is not relatively pristine and channels within the sub-basin have significant floodplains.

Restore Shoreline Conditions

- Rank 1 – There are one or more primary focus reaches and the shoreline conditions are "degraded" or "moderately degraded."
- Rank 2 – Shoreline conditions are "degraded" or "moderately degraded" along fish-bearing waters within the sub-basin but not specifically along primary focus reaches.
- No Action (Shaded) – Shoreline conditions have been surveyed and are "intact."
- Data Gap (DG) – No information has been compiled on shoreline conditions within the sub-basin.

Restore Hydrologic Processes

- Rank 1 – Peak flow hydrology is "intact" in 50 to 80% of the sub-basin based on the watershed process modeling.
- No Action (Shaded) – Hydrologic processes are "intact" in over 80% of the sub-basin area. Urban lowland streams with hydrologic processes that are less than 50% intact

are also in this category because there are limited opportunities to restore hydrologic processes in these situations.

Restore Sediment Processes

- Rank 1 – Sediment processes are "degraded" within the sub-basin based on the watershed process analysis.
- Rank 2 – Sediment processes are "intact" within the sub-basin based on the watershed process analysis in Step 3, but specific problem areas are identified based on quantitative data reported in the HCR and LFA.
- No Action (Shaded) – Sediment processes are "intact" within the sub-basin based on the watershed process analysis in Step 3 and no specific problem areas are identified based on quantitative data reported in the HCR and LFA.
- Data Gap (DG) – Due to modeling limitations, sediment processes were only modeled in basins with a mean elevation greater than or equal to 1000 meters.

Riparian Enhancement

- Rank 1 – Sub-basin contains one or more primary focus reaches and riparian conditions are "moderately degraded" or "degraded" along the primary focus reaches.
- Rank 2 – Sub-basin contains "moderately degraded" or "degraded" riparian habitat, but the habitat does not occur along primary focus reaches.
- No Action (Shaded) – Riparian conditions are "intact" within the sub-basin.

Address Water Quality Impacts

- Rank 1 – Sub-basin contains one or more primary focus reaches and water quality is "moderately degraded" or "degraded."
- Rank 2 – Water quality conditions are "moderately degraded" or "degraded" within the sub-basin, but water quality problems are not found along primary focus reaches or where there is uncertainty regarding the extent to which water quality conditions reflect human impacts or are naturally occurring.
- No Action (Shaded) – Water quality conditions have been surveyed and are "intact."
- Data Gap (DG) – Water quality conditions have not been surveyed.

Nutrient Enhancement

- Rank 1 – Not applicable. Nutrient enhancement will never be a first tier action because it addresses a symptom of depressed salmonid runs rather than a root cause. Addition of salmon carcasses to waterbodies in a sub-basin provides nutrient enhancement for only one year and therefore is not self-sustaining.

- Rank 2 – Sub-basin contains reaches with low escapement relative to historic conditions and does not have water quality problems.
- No Action (Shaded) – Sub-basin does not meet the second tier criteria.

Instream Structure Enhancement

- Rank 1 – Not applicable. Placing LWD in rivers and streams will never be a first tier action because it addresses a symptom of depressed salmonid runs rather than a root cause. Instream structure placement will not likely be self-sustaining, and therefore will not improve habitat over the long-term.
- Rank 2 - LWD abundance and riparian conditions are "moderately degraded" or "degraded" within the sub-basin based.
- No Action (Shaded) - LWD abundance and/or riparian conditions are "intact".
- Data Gap (DG) – Data do not exist on LWD abundance.

Table 1. Basin-wide Strategy

							Ranked actions among subbasin strategy groups*										
Geo-spatial group	**Subbasin strategy groups**	**Chinook/bull Trout use and potential class**	**Current watershed process condition class**	**Subbasins contained within group**	**Description**	**Hypothesis**	**Preservation - proximate to aquatic habitat**	**Preservation - to support hydrologic and sediment processes**	**Remove anthropogenic instream barriers along or adjacent to priority reaches**	**Reconnect off channel habitats**	**Restore shoreline conditions**	**Restore hydrologic processes (for peakflow and baseflow)**	**Restore sediment processes**	**Riparian enhancement**	**Address water quality impacts**	**Marine derived nutrient enhancement**	**Instream structural enhancement (i.e. ELJs)**
Nearshore	Nearshore restoration	High	Moderately Degraded	Nearshore	Shoreline from Mukilteo to Kayak Point including Puget Sound out to 30 m depth below MLLW and upland areas to the top of coastal bluffs.	Additional restoration of the Puget Sound nearshore environment was identified in the preliminary EDT analysis as necessary for achieving population performance levels that fall within the Shared Strategy planning range. Reducing the extent of the modific	1				1		1	1	2		
Estuary	Estuary restoration	High	Degraded	Estuary	Critical habitat for juvenile salmonid to rear and make the fresh to salt water transition. Defined here as the mainstem, sloughs and marshes between Possession Sound and the divergence of Ebey Slough from the mainstem.	Preliminary modeling with EDT identified the estuary as one of the most important places to focus preservation and restoration actions for both chinook populations. The loss of 85 percent of the historic tidal marsh area, loss of edge habitat complexity	1		1	1	1			1	2		2
Mainstems	Mainstems - primary restoration	High	Moderately Degraded or Degraded	Skykomish River - Lower Mainstem, Skykomish River Upper Mainstem, Skykomish River - South Fork, Skykomish River - Upper South Fork, Sultan River - Lower, Snoqualmie River - Mid Mainstem, Snoqualmie River - Upper Mainstem, Pilchuck River - Middle, Upper Sn	Large rivers with floodplains in the mid and lower basin. Critical spawning and rearing areas for chinook and other species. Also, critical habitat for sub-adult bull trout and foraging habitat for adult bull trout exhibiting a fluvial life history strat	Along with the estuary, these subbasins have been identified as having the highest potential gains with restoration and highest potential losses if further degradation occurs. While spawning habitat quality has been impacted in some locations by altered	1	1	1	1	1	1	data gap	1	2		2
	Mainstems - secondary restoration	Moderate	Moderately Degraded	May Creek/Lower Wallace, Skykomish River - Lower North Fork, Skykomish River - Lower South Fork, Woods Creek - Lower, Snoqualmie River Mouth, Tolt River - South Fork Below Dam, Pilchuck River - Lower, Coal Creek -Lower	Small rivers with floodplains and large mainstem rivers. Channel conditions impacted by urban and rural development, forestry and transportation corridors.	Although not as critical as in first tier mainstems, restoring riparian forests and floodplain connectivity, correcting fish passage barriers, and preventing urban sprawl within these areas will be necessary to achieve population performance levels within	2	1	2	2	2	1	data gap	2	3		3
Lowland tributaries	Rural streams - primary restoration	Moderate	Moderately Degraded	Woods Creek - West Fork, Cherry Creek	Large rural tributaries that contain or have the potential to support moderate levels of chinook spawning. Also important for coho.	These are the most important subbasins for chinook within the tributary geospatial group. They have a similar level of importance in a basinwide strategy to the mainstem - second tier class in terms of spawning. However, the channels are smaller and more	2	1	2		2	1	data gap	2	3		3
	Rural streams - secondary restoration	Low	Moderately Degraded	Bear Creek, Woods Creek, Ames Creek, Harris Creek, Patterson Creek, Debuque Creek, Little Pilchuck Creek, French Creek, Tulalip/Battle Creeks*	Smaller rural tributaries that are rapidly developing. Used by chinook at low levels, but are important for coho.	Protecting and restoring watershed processes and restoring accessibility within these subbasins is important for multi-species protection and to support suitable conditions downstream for chinook spawning and rearing.	3	1	3		3	1	data gap	3	3		4
	Urban stream restoration	Low	Degraded	Lake Stevens Drainages, Everett Coastal Drainages, Fobes Hill, Quilceda Creek, Allen Creek, Sunnyside Drainages	Subbasins flanking the Snohomish estuary that have high levels of development or development pressures. Used by coho and cutthroat, but little to no chinook spawning. Lower reaches provide rearing habitat for chinook.	Watershed processes have been substantially altered within this subbasin strategy group. Managing these areas to prevent downstream impacts will be adequate for a basinwide chinook strategy if substantial restoration efforts are undertaken in other areas	3		3		3			3	3		4

Continued on next page.

Table 1. Basin-wide Strategy (continued)

							Ranked actions among subbasin strategy groups*										
Geo-spatial group	**Subbasin strategy groups**	**Chinook/bull Trout use and potential class**	**Current watershed process condition class**	**Subbasins contained within group**	**Description**	**Hypothesis**	**Preservation - proximate to aquatic habitat**	**Preservation - to support hydrologic and sediment processes**	**Remove anthropogenic instream barriers along or adjacent to priority reaches**	**Reconnect off channel habitats**	**Restore shoreline conditions**	**Restore hydrologic processes (for peakflow and baseflow)**	**Restore sediment processes**	**Riparian enhancement**	**Address water quality impacts**	**Marine derived nutrient enhancement**	**Instream structural enhancement (i.e. ELJs)**
Headwaters	Headwaters -primary protection	High	Intact	Skykomish River - Upper North Fork, Foss River	Subbasins in the upper watershed that are accessed by anadromous fishes and have intact watershed process. Some forestry and recreational impacts. Contain only bull trout spawning habitat and moderate levels of chinook spawning.	Because they contain the only bull trout spawning within the Snohomish basin, preservation of watershed process conditions within these subbasins is critical. A few opportunities exist to reconnect habitat and improve conditions along the channel edge. T	1	1			1					2	
	Headwaters-secondary restoration	Moderate	Moderately Degraded	Griffin Creek, Tolt River - North Fork, Beckler River, Pilchuck River - Upper, Tokul Creek*	Subbasins located primarily in the cascade foothills. Forestry is the dominant land use. Diking and rural residential development in lower portions of subwatersheds. Moderate use or potential for chinook and significant use by coho.	Restoring watershed process is important for supporting spawning and rearing that is occurring within these subbasins and in downstream reaches. Significant opportunities also exist to improve spawning and rearing through the reconnection of habitat. Ac	2	1	2	2	2	1	1	2	3	3	3
	Headwaters - secondary protection	Low	Intact	Tye River, Wallace River - Upper, Olney Creek, Rapid River, Miller River	Intact subbasins in the upper watershed that have low levels of chinook use.	Preservation of watershed processes is important for supporting watershed processes in downstream reaches with high current use or potential.	3	1	3	3	3				3		
	Headwaters - protection above natural barriers	Resident population only	Intact	Snoqualmie River - Upper North Fork, Pratt River, Taylor River, Snoqualmie River - Upper Middle Fork	Above Snoqualmie Falls and located primarily within the Alpine Lakes Wilderness . Watershed processes are largely intact.	Preservation of intact watershed process conditions will protect habitat for resident trout above Snoqualmie Falls and maintain the conditions that support high quality spawning and rearing habitat for anadromous salmonids downstream in the mainstem Snoqu		1									5
	Headwaters - restoration above falls and dams	Resident population only	Moderately Degraded	Tolt River - South Fork above Dam, Sultan River - Upper, Snoqualmie River - Upper South Fork, Snoqualmie River - Lower Middle Fork, Tate Creek, Coal Creek - Upper, Snoqualmie River - Lower North Fork, Snoqualmie River - Lower South Fork	Areas without anadromous fish access and moderately degraded conditions.	Reforestation, decommissioning of forest roads, and riparian enhancment will help to improve instream conditions in focus reaches downstream. Improving fish passage will increase the quantity of habitat available to resident trout.		1	4		4	1	1	3	3		5

*Prioritization across Snohomish basin 1 (high) > 5(low). If the box is shaded, the action is not applicable, appropriate or necessary.

Note: Like subbasins are organized into subbasin strategy groups based on three characteristics: geo-spatial class, Chinook and bull trout use and potential class and watershed process condition class. Hypotheses are generated for each subbasin strategy group to define their unique role in a basin-wide strategy. Additional prescriptions are recommended for coho along small streams. Snohomish coho populations are distributed broadly across the basin and are critical for maintaining healthy and harvestable runs in a regional context.

Table 2. Sub-basin Strategy

Subbasin	Subbasin strategy groups							Primary focus reaches	Secondary focus reaches	Ranked actions within subbasins *(Bold text in this section identifies high/extreme potential gains from restoration in EDT analysis (May 2002)*									
Component	Geospatial class	Chinook/bull trout use and potential priority class			Watershed process current condition class	Subbasin strategy group				Preservation (proximate to aquatic habitat)	Preservation (to support hydrologic and sediment process)	Remove anthropogenic instream barriers	Reconnect off-channel habitats	Restore edge habitat condition	Restore hydrologic processes	Restore sediment processes	Riparian enhancement	Address water quality impacts	Nutrient enhancement	Instream structural enhancement
		Chinook	Bull Trout	Combined BT/Chinook							i.e. acquiring large forest and wetland sites	(from step 2 and culvert database)	(from NTAA, HCR and LFA)	(from step 2)	(from step 3)	(from step 3 and/or step 2)	(from step 3)	(from step 2)	(from step 4 and WQ data)	(from step 2 and step 3
Classification	Est/Near, Mainstem, Lowland Tributary, Headwater	Class A, B, C or D	Class A, B, C or D	Class A, B, C or D	A - hydrology, riparian and sediment conditions all intact B - one or more (but not all three) watershed process conditions moderately degraded or degraded C - hydrology, riparian and sedimen			Focus reaches identified in the NTAA and bull trout spawning reaches in the Upper North Fork Sky and Foss River subbasins identified by WDFW	EDT chinook reaches and bull trout spawning reaches in the Upper North Fork Sky and Foss River subbasins identified by WDFW	1 = first tier - if subbasin contains priority reaches 2 = second tier - if subwatershed does not contain priority reaches	Always a first tier priority	1 = first tier - barriers along or adjacent to a priority reach 2 = second tier - barriers along fish bearing waters	1 = first tier - disconnected habitat along a priority reach 2 = second tier -disconnected habitat in the anadromous zone	1 = first tier - *Degraded* or *Mod Degraded* conditions along a priority reach 2 = second tier - *Degraded* or *Mod Degraded* within the subwatershed	1 = first tier - *Degraded* or *Mod Degraded* conditions within the subwatershed	1 = first tier - *Degraded* or *Mod Degraded* conditions within the subwatershed	1 = first tier - *Degraded* or *Mod Degraded* conditions along a priority reach 2 = second tier - *Degraded* or *Mod Degraded* within the subwatershed	1 = first tier - *Degraded* or *Mod Degraded* conditions along a priority reach	2 = second tier - high or moderate change in potential and no current nutrient related problems	2 = dearth of LWD in a priority reach and *Degraded* or *Mod Degraded* riparian conditions
Nearshore	Nearshore	A	A	A	N/D	Nearshore restoration			Shoreline Mukilteo to Kayak Point	**1**	1			1		DG	1	2		DG
Snohomish Estuary	Estuary	A	A	A	C	Estuary restoration		Mainstem and sloughs RM 0 8.1	Mainstem and sloughs RM 0 8.1	**1**			**1**	**1**		DG	**1**	2		2
Raging River	Headwater	B	C	B	B	Mainstem-primary restoration			Mainstem RM 0-12.7	**2**	1	2	**1**	**1**	**1**	**1**	**1**	DG		2
Skykomish River - Lower Mainstem	Mainstem	A	B	A	B	Mainstem-primary restoration		Mainstem RM 0-6.2, 10.3-13.9	Mainstem 0-13.9	**1**	1	2	**1**	**1**		**DG**	**1**	2		2
Skykomish River - Upper Mainstem	Mainstem	A[P]	C	A	B	Mainstem-primary restoration		Mainstem RM 13.9-18.4	Mainstem 13.9-28.9	**1**	1	2		**1**		**1**	**1**	2		DG
Skykomish River - South Fork	Mainstem	A[P]	C	A	B	Mainstem-primary restoration			Mainstem RM 6.1-14.2	**1**	1	2	1	1		**1**	1	2		DG
Skykomish River - Upper South Fork	Mainstem	A[C]	C	A	B	Mainstem-primary restoration			Mainstem RM 14.2-19.9	1	1	2		**1**			**1**	2		DG
Sultan River - Lower	Mainstem	A[C]	C	A	B	Mainstem-primary restoration		Mainstem RM 0-9.7	Mainstem RM 0-9.7	**1**	1	**2**	1		1*	DG	1			DG
Snoqualmie River - Mid-Mainstem	Mainstem	A[P]	C	A	B	Mainstem-primary restoration		Mainstem RM 21.3 - 24.8	Mainstem RM 9.9 - 24.8	**1**	1	2	**1**	**1**	**1**	**DG**	**1**	**1**		2
Snoqualmie River - Upper Mainstem	Mainstem	A[P]	C	A	B	Mainstem-primary restoration		Mainstem RM 24.8-27.3, 32.1-38.6	Mainstem RM 24.8-38.6	**1**	1	1	**1**	**1**		**DG**	**1**	**1**		2
Pilchuck River - Middle	Mainstem	A[P]	C	A	B	Mainstem-primary restoration			Mainstem RM 8.5-28.8	1	1	**2**	**1**	**1**	**1**	**DG**	**1**	**2**		2
Upper Snohomish/Cathcart	Mainstem	A[P]	A	A	C	Mainstem-primary restoration		Mainstem RM 13.9-19.7	Mainstem RM 13.9-19.7	**1**	1	2	**1**	1	1	DG	1	2		2
Lower Snohomish/Marshland	Mainstem	A[P]	C*	A	C	Mainstem-primary restoration			Mainstem RM 8.1-13.9	**1**	1	1	**1**	**1**	1	DG	**1**	1		2
Tolt River - Lower	Mainstem	A[C]	C	B	B	Mainstem-primary restoration		Mainstem RM 0-5.0	Mainstem RM 0-8.4	**2**	1		**1**	**1**	**1**	**1**	**1**			2
Skykomish River - Lower South Fork	Mainstem	B	C	B	B	Mainstem-secondary restoration		Mainstem RM 0-3.3, BV creek RM 0-1.7	Mainstem RM 0-6.1, BV RM 0-1.7	2	1	2	DG	**2**		1	**2**			DG
Woods Creek - Lower	Mainstem	B[P]	C	B	B	Mainstem-secondary restoration			Mainstem RM 0-6	**2**	1	2	2	DG		DG	2	2		2
Snoqualmie River - Mouth	Mainstem	B[P]	C	B	B	Mainstem-secondary restoration		Mainstem RM 0-4.3	Mainstem RM 0-9.9	**2**	1	1	2	**2**		**DG**	**2**	2		2
Tolt River - South Fork Below Dam	Mainstem	B[P]	C*	B	B	Mainstem-secondary restoration			Mainstem RM 0-12.0	**2**	1			**1**	1	**1**	**1**			2
Pilchuck River - Lower	Mainstem	B[P]	C	A	C	Mainstem-secondary restoration			Mainstem RM 0-8.5	2	1	2	**1**	**2**	**1**	DG	**2**	2		2
Coal Creek - Lower	Mainstem	B	C*	B	B	Mainstem-secondary restoration			None	2	1	DG		2	1	DG	2	2		2
May Creek/Lower Wallace River	Mainstem	B	C	B	B	Mainstem-secondary restoration			Mainstem RM 0-4.6	2	1	2	DG	**DG**	**1**		**2**	2		2
Skykomish River - Lower North Fork	Mainstem	B[P]	C	B	B	Mainstem-secondary restoration			Mainstem RM 0-10.1	**2**	1	2	DG	**2**		1	**2**			DG
Woods Creek - West Fork	Tributary	B[P]	C	B	B	Rural streams-primary restoration			Mainstem RM 0-8.1	**2**	1	2		**DG**		DG	**2**	DG		DG
Cherry Creek	Tributary	B[P]	C*	B	B	Rural streams-primary restoration			Mainstem RM 0-1.9	2	1	1	**1**	**1**		**DG**	**1**	1		2

Continued on next page

Table 2. Sub-basin Strategy (continued)

Subbasin	Subbasin strategy groups							Primary focus reaches	Secondary focus reaches	Ranked actions within subbasins (*Bold text in this section identifies high/extreme potential gains from restoration in EDT analysis (May 2002)*)										
Component	Geospatial class	Chinook/bull trout use and potential priority class			Watershed process current condition class	Subbasin strategy group				Preservation (proximate to aquatic habitat)	Preservation (to support hydrologic and sediment process)	Remove anthropogenic instream barriers	Reconnect off-channel habitats	Restore edge habitat condition	Restore hydrologic processes	Restore sediment processes	Riparian enhancement	Address water quality impacts	Nutrient enhancement	Instream structural enhancement
		Chinook	Bull Trout	Combined BT/Chinook							i.e. acquiring large forest and wetland sites	(from step 2 and culvert database)	(from NTAA, HCR and LFA)	(from step 2)	(from step 3)	(from step 3 and/or step 2)	(from step 3)	(from step 2)	(from step 4 and WQ data)	(from step 2 and step 3
Classification	Est/Near, Mainstem, Lowland Tributary, Headwater	Class A, B, C or D	Class A, B, C or D	Class A, B, C or D	A - hydrology, riparian and sediment conditions all intact B - one or more (but not all three) watershed process conditions moderately degraded or degraded C - hydrology, riparian and sedimen			Focus reaches identified in the NTAA and bull trout spawning reaches in the Upper North Fork Sky and Foss River subbasins identified by WDFW	EDT chinook reaches and bull trout spawning reaches in the Upper North Fork Sky and Foss River subbasins identified by WDFW	1 = first tier - if subbasin contains priority reaches 2 = second tier - if subwatershed does not contain priority reaches	Always a first tier priority	1 = first tier - barriers along or adjacent to a priority reach 2 = second tier - barriers along fish bearing waters	1 = first tier - disconnected habitat along a priority reach 2 = second tier -disconnected habitat in the anadromous zone	1 = first tier - *Degraded* or *Mod Degraded* conditions along a priority reach 2 = second tier - *Degraded* or *Mod Degraded* within the subwatershed	1 = first tier - *Degraded* or *Mod Degraded* conditions within the subwatershed	1 = first tier - *Degraded* or *Mod Degraded* conditions within the subwatershed	1 = first tier - *Degraded* or *Mod Degraded* conditions along a priority reach 2 = second tier - *Degraded* or *Mod Degraded* within the subwatershed	1 = first tier - *Degraded* or *Mod Degraded* conditions along a priority reach	2 = second tier - high or moderate change in potential and no current nutrient related problems	2 = dearth of LWD in a priority reach and *Degraded* or *Mod Degraded* riparian conditions
Bear Creek	Tributary	D	C*	B	B	Rural streams-secondary restoration			None	2	1	2		DG		DG	2	DG		DG
Woods Creek	Tributary	C	C	B	B	Rural streams-secondary restoration			Mainstem RM 3.7-7.6	2	1	2		**DG**		DG	**2**	2		2
Ames Creek	Tributary	D	C*	C	B	Rural streams-secondary restoration			None	2	1	2	2	2		DG	2	DG		
Harris Creek	Tributary	C[c]	C*	A	B	Rural streams-secondary restoration			None	2	1	2	2	2		DG	2	DG		
Patterson Creek	Tributary	C	C*	B	B	Rural streams-secondary restoration			None	2	1	1	DG	**DG**	**1**	**1**	**1**	1		2
Dubuque Creek	Tributary	D	C*	B	B	Rural streams-secondary restoration			None	2	1	DG		DG		DG	2	2		2
French Creek	Tributary	C	C*	C	B	Rural streams-secondary restoration			None	2	1	1	1	2	1	DG	2	1		2
Little Pilchuck Creek	Tributary	D	C*	B	B	Rural streams-secondary restoration			None	2	1	DG		DG		DG	2	DG		2
Tulalip and Battle Creeks	Tributary	D	D	D	B	Rural streams-secondary restoration			None	2	1	1		DG	1	DG	2			
Lake Stevens Drainages	Tributary	D	C*	B	C	Urban stream restoration			None	2	1	2		DG		DG	2	2		2
Everett Coastal Drainages	Tributary	D	C*	C	C	Urban stream restoration			None	2	1	DG		DG		DG	2	2		2
Fobes Hill	Tributary	D	C*	C	C	Urban stream restoration			None	2	1	2		2		DG	2	2		2
Quilceda/Allen Creek	Tributary	C	C*	B	C	Urban stream restoration			Mainstem RM 0.8-8.0, MF RM 0-2.5	2	1	2		2		DG	2	2		2
Sunnyside Drainages	Tributary	D	C*	C	C	Urban stream restoration			None	2	1	2		DG		DG	2	2		2
Skykomish River - Upper North Fork	Headwater	B[p]	A	A	A	Headwaters-primary protection		Mainstem RM 16.2-20.7, Goblin Cr RM 0-0.6, Salmon Cr RM 0-0.6, West Cady RM 0-0.25, Troublesome Cr RM 0-3.2	Mainstem RM 10.1 - 20.7, Goblin Cr RM 0-0.6, West Cady RM 0-0.25, Troublesome Creek RM 0-3.2	**1**	1			**1**				DG	2	
Foss River	Headwater	C	B	B	A	Headwaters-primary protection			Mainstem RM 0-4.7, WF RM 0-2.2	2	1									
Beckler River	Headwater	B[p]	C	B	B	Headwaters-secondary restoration			Mainstem RM 0-12.1	**2**	1					1		2		
Pilchuck River - Upper	Headwater	B[p]	C	B	B	Headwaters-secondary restoration			Mainstem RM 28.8-36.6	2	1	1		2					2	
Griffin Creek	Headwater	B[p]	C*	A	B	Headwaters-secondary restoration			Mainstem RM 0-1.0	**2**	1	1	**1**	**1**	**1**	**1**	**1**	1		2
Tolt River - North Fork	Headwater	B[p]	C	B	B	Headwaters-secondary restoration			Mainstem RM 0-3.0	**2**	1	2	2	**1**	1	**DG**				2
Miller River	Headwater	C	C	A	A	Headwaters-secondary restoration			Mainstem RM 0-3.6	2	1							2		
Tokul Creek	Headwater	C	C	C	B	Headwaters-secondary restoration			Mainstem RM 0-2.4	2	1	**1**	**2**	**1**	1	**1**	**2**			
Tye River	Headwater	C	C*	C	B	Headwaters-secondary protection			Mainstem RM 0-4.8	2	1			DG		1		2		
Wallace River - Upper	Headwater	D	C*	A	B	Headwaters-secondary protection			None	2	1	2				1		DG		
Olney Creek	Headwater	D	C*	B	A	Headwaters-secondary protection			None	2	1	DG						DG		
Rapid River	Headwater	C	C*	B	A	Headwaters-secondary protection			Mainstem RM 0-3.5	2	1							DG		
Snoqualmie River - Upper Middle Fork	Headwater	D	D	D	A	Headwaters-protection above natural barriers			None	2	1	DG				1		DG		
Snoqualmie River - Upper North Fork	Headwater	D	D	D	A	Headwaters-protection above natural barriers			None	2	1	DG						DG		
Taylor River	Headwater	D	D	D	A	Headwaters-protection above natural barriers			None	2	1	DG						DG		
Pratt River	Headwater	D	D	D	A	Headwaters-protection above natural barriers			None	2	1	DG						DG		
Tolt River - South Fork above Dam	Headwater	D	D	D	B	Headwaters- restoration above falls & dams			None	2	1	2			1	1	**2**	DG		2
Sultan River - Upper	Headwater	D	D	D	B	Headwaters- restoration above falls & dams			None	2	1	1				1	2			
Snoqualmie River - Upper South Fork	Headwater	D	D	D	B	Headwaters- restoration above falls & dams			None	2	1	DG			1	1	2	2		2
Snoqualmie River -Lower Middle Fork	Headwater	D	D	D	B	Headwaters- restoration above falls & dams			None	2	1	2			1		2	DH		2
Tate Creek	Headwater	D	D	D	B	Headwaters- restoration above falls & dams			None	2	1	DG			1		2	DG		DG
Coal Creek - Upper	Headwater	D[p]	D	D	B	Headwaters- restoration above falls & dams			None	2	1	DG			1	DG	DG	DG		DG
Snoqualmie River - Lower North Fork	Headwater	D	D	D	B	Headwaters- restoration above falls & dams			None	2	1	DG			1	DG		DG		DG
Snoqualmie River - Lower South Fork	Headwater	D	D	D	B	Headwaters- restoration above falls & dams			None	2	1	DG			1	DG	1	1		2

DG = Data Gap